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MANUFACTURING PERFUMER

A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP

Vol. XXXII No. 1 JANUARY 1961

metal and plastic
TUBES

only Metal Box
offers a range so *complete!*

Metal Box metal and plastic tubes are available in a quite exceptional range of shapes and sizes, with a wide variety of closures each designed to keep the contents in thoroughly good condition. All—up to 34 fluid ounces in capacity—are light (*lower freight charges*), virtually unbreakable (*no breakage claims*) and can be decorated in superb multicolour printing (*for increased sales appeal*).

Metal Box also offers freely three unrivalled services: a research service to test the compatability of the tube with your products; a container design service to design special tubes for special requirements, and studios to carry out surface design.

MB METAL BOX

THE WIDE RANGE OF SIZES CATERS FOR ALL REQUIREMENTS, FROM BULK PACKS TO SAMPLES.
Aluminium tubes. *Diameters from 12·5mm to 75mm with depths from 1·5 to 7 times the diameter, maximum 230mm.*
Plastic tubes. *Diameters from 9·3mm to 36mm and depths from 25·4mm to 89·7mm.*

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MB 07/01

Meet Miss Beatson

Miss Beatson represents
the modern outlook
at Beatson, Clark.
Latest production methods,
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ensure top quality
at reasonable prices.
Stocks of many series are held
and these are packed, whilst still
in a production-clean condition,
into sealed cartons
thus providing hygienic storage.

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BEATSON *bottles for busy chemists*

BEATSON, CLARK & CO. LTD.

ROTHERHAM · YORKSHIRE *Telephone : Rotherham 3188* • *Glass Bottle Manufacturers since 1751*

MB I

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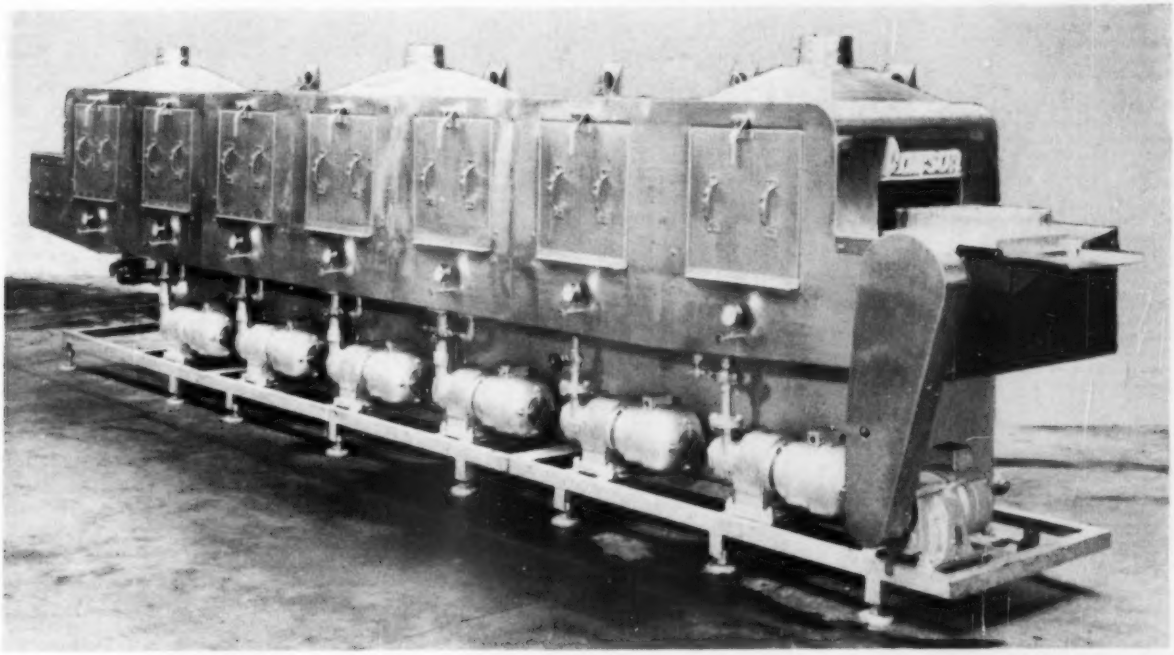
Special DAWSON Bottlewashing Machine for EVANS MEDICAL Ltd.



THIS IS THE VARIETY OF BOTTLES HANDLED BY THIS MACHINE

1 oz., 2 oz., 4 oz. and 8 oz. Medical Flats
2½ oz., 5 oz. and 10 oz. Provence
4 oz. Toilet Ovals

This machine designed and manufactured to meet the specific requirements of Evans Medical Ltd., handles the wide variety of glassware listed in the adjacent panel. The items are carried in baskets on a moving conveyor through a multistage high temperature washing and rinsing treatment delivered by batteries of jets below and a series of spray boxes above, the final rinsing stages being with hot distilled water to ensure a high degree of commercial sterility. The machine which is constructed throughout from stainless steel handles up to 2,000 items per hour.

This installation is a typical example of the way in which Dawson Bros. Ltd., can offer machines specially tailored to suit specific requirements. It is this facility, coupled with their long experience in the industrial washing field which makes the name "Dawson" the first to spring to mind wherever there is a container cleaning problem.

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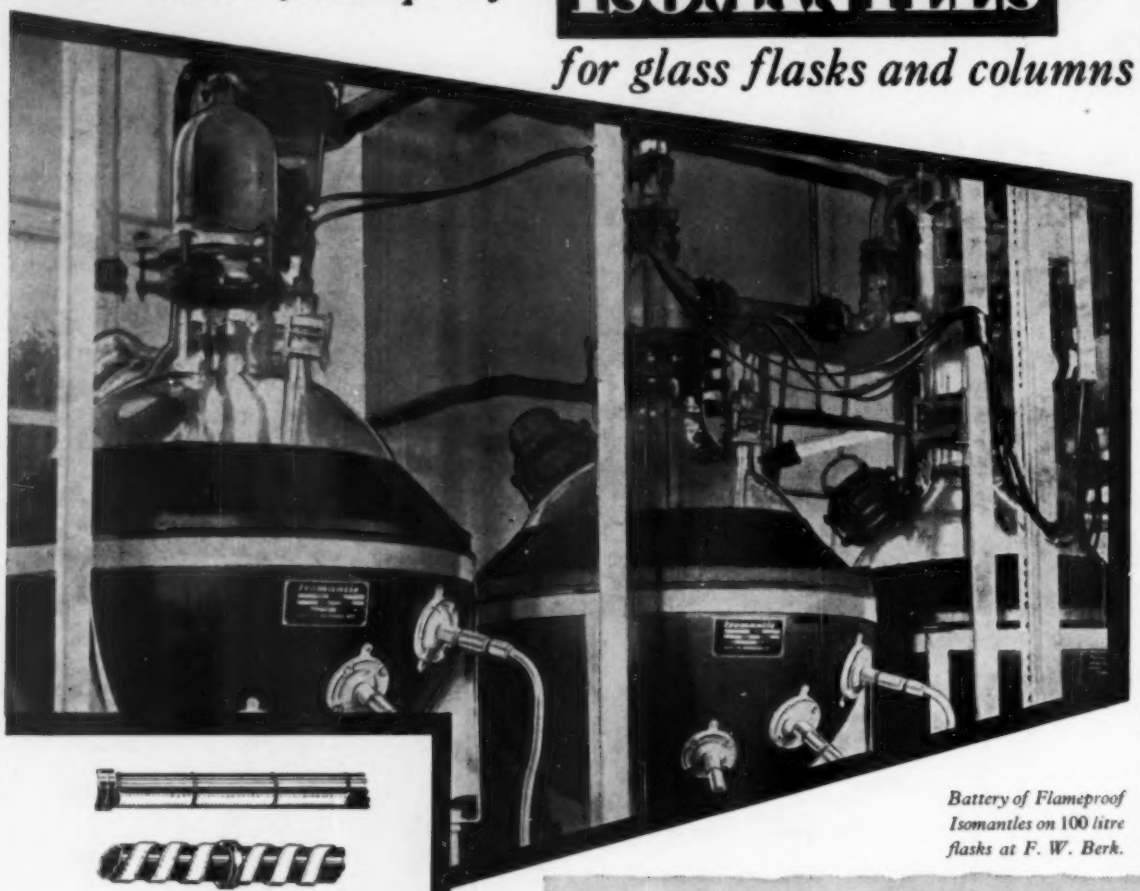
flameproof **ISOMANTLES**

for glass flasks and columns



Battery of Flameproof Isomantles on 100 litre flasks at F. W. Berk.

Special Flameproof Isotapes

For all Laboratory Flasks

Energy Regulator in Flameproof housing

Apart from standard Isomantles, a full range of special equipment is available suitable for Flameproof areas groups I, II, III (Patent Number 713768) and accepted by the Authorities. This covers all flask sizes, cylindrical, reaction vessels with hemispherical bases and columns. Metal sheathed mineral insulated heating elements lead into Flameproof glands and terminal boxes. The element temperature is of course, kept below the ignition point of gas mixtures present; manual regulators in Buxton certified enclosures or automatic intrinsically safe controls are provided.

Fully described in catalogue LM (Glass Plant) and catalogue PLT (Metal Vessels)—do ask for copies.

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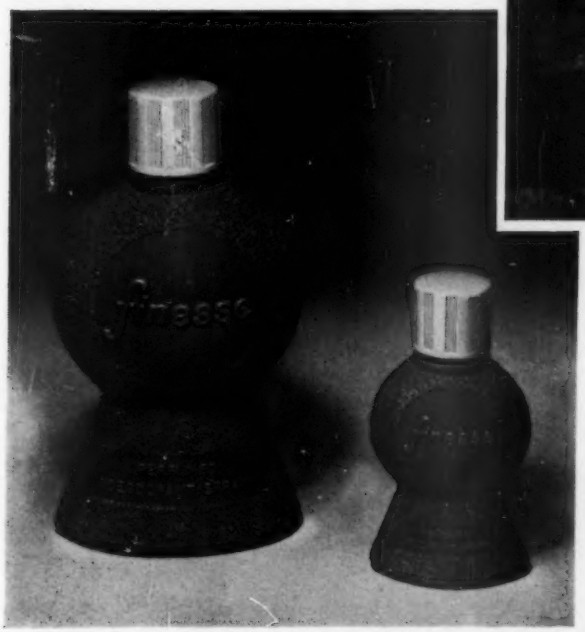
SHAPES

Here are three containers produced by 'SKYLON' Each has a story to tell

The container shown above is purely functional and, with a moulded-in handle and 80 oz. capacity, will be found most useful doing the "chores" around **YOUR OWN** Works.



The two illustrations shown here are of custom moulded bottles, designed to appeal to **YOUR CUSTOMER.**

Send for our comprehensive Catalogue—you'll find it most informative *if you are thinking in terms of polythene.*

ELGAR 6006

FIBRENYLE LTD

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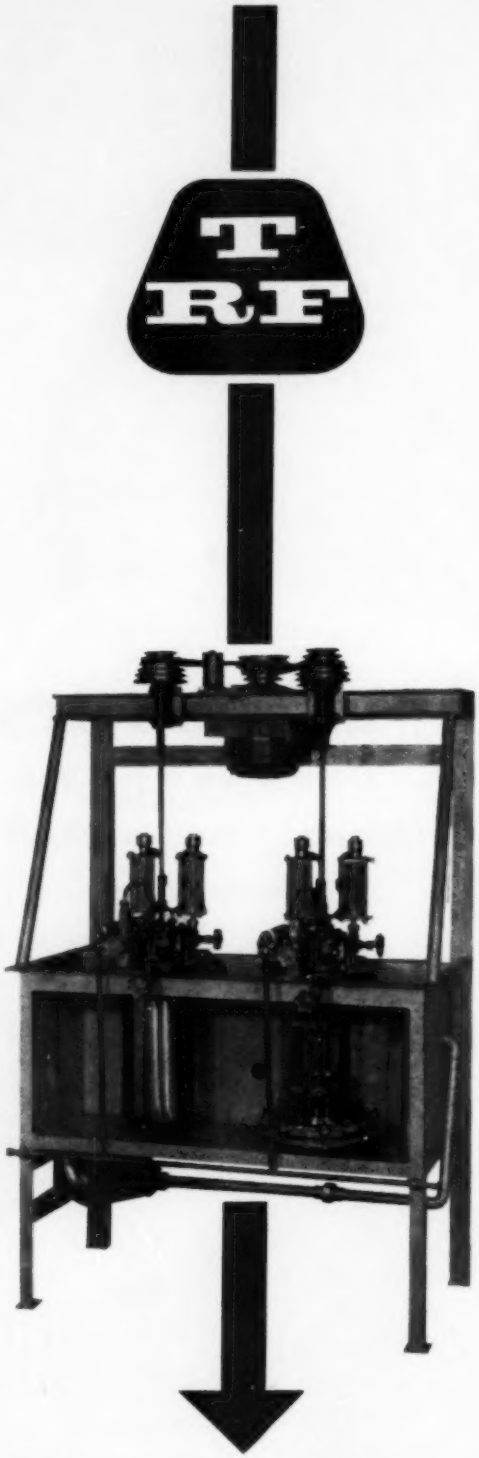
ONE STEP AHEAD



Stop and consider. How can stainless steel help to improve *your* laboratory?

Take, for instance, the illustrated fermenter, showing alternative glass and stainless steel vessels, and based on a design by Professor E. B. Chain, F.R.S., the microbiology specialist. To T.R.F., the experts in stainless steel planning and production, this was yet another problem which called for their individual skills . . . the same skills which they can apply to *your* equipment problems. Better get in touch with them, soon!

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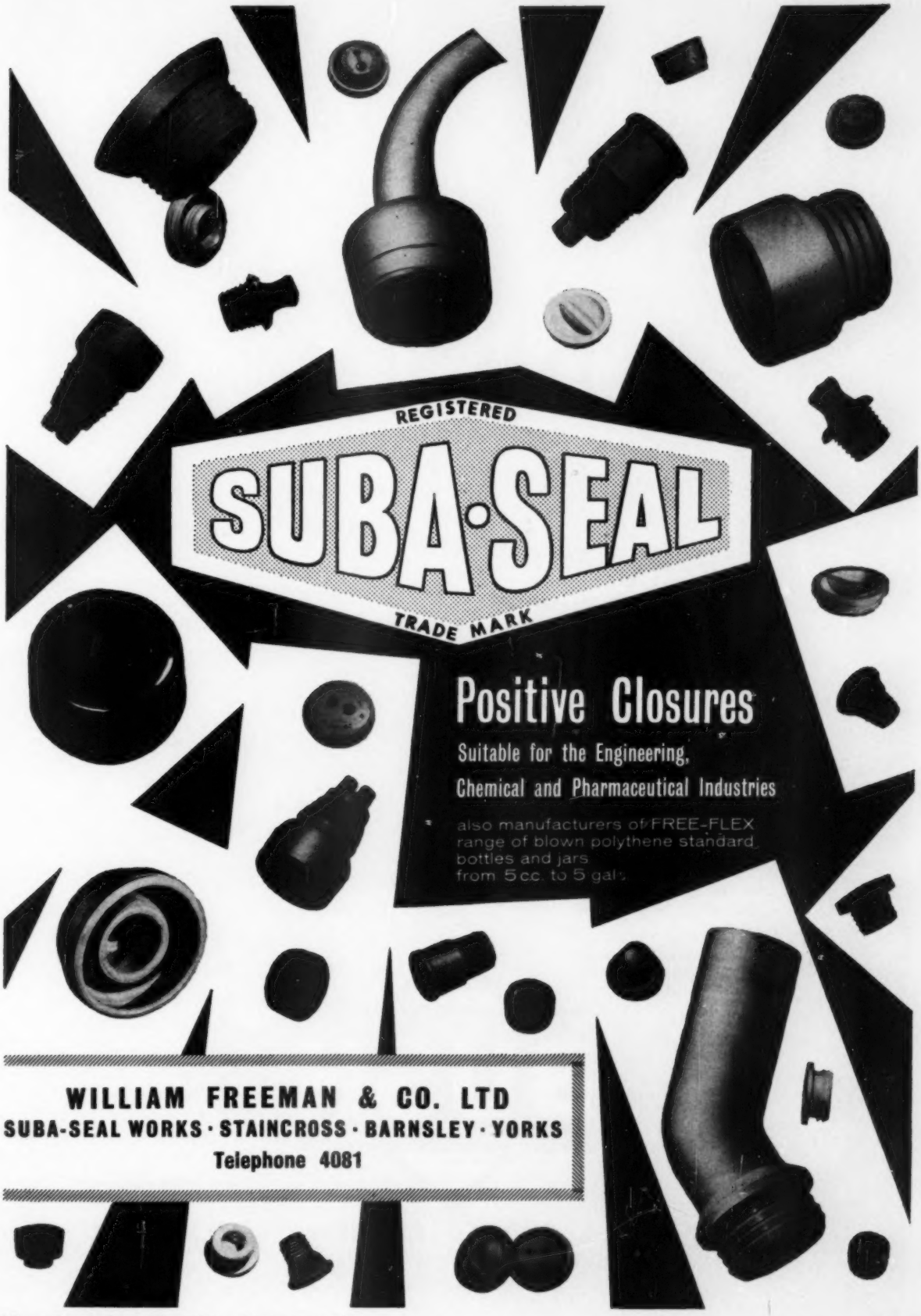
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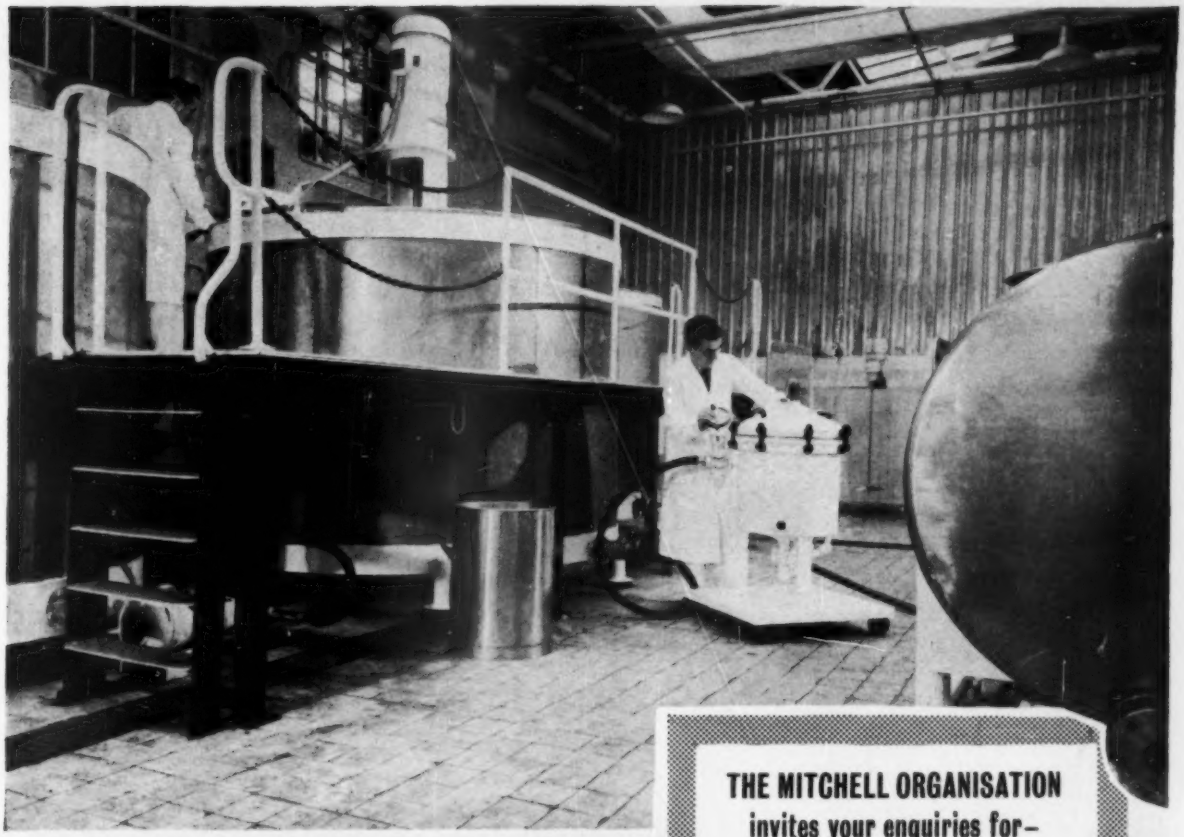
(Photograph by courtesy of Evans Medical Ltd., Speke, Liverpool)



Mitchell's specialise in pharmaceutical equipment

The illustration shows a Mitchell two-speed turbine type agitator suitable for light and medium viscosity fluids and a Sparkler horizontal-plate filter for clarifying pharmaceutical liquors.

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invites your enquiries for–

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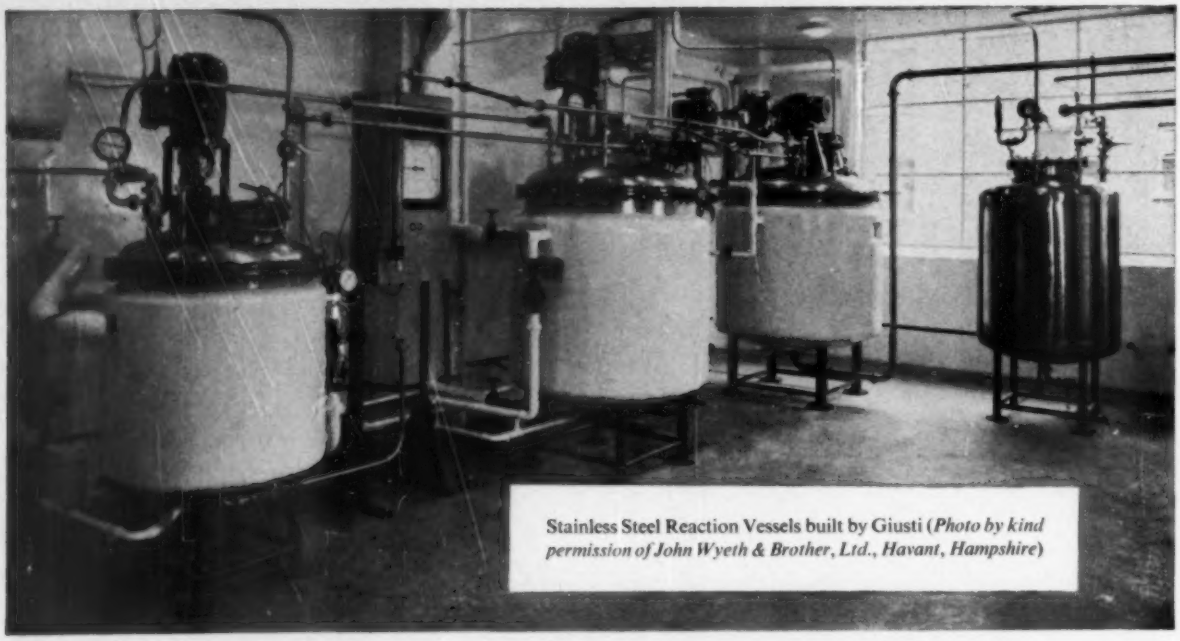

Stainless Steel Reaction Vessels built by Giusti (*Photo by kind permission of John Wyeth & Brother, Ltd., Havant, Hampshire*)

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stainless steel plant by

GIUSTI

Our experience of stainless steel fabrication has been built up over a generation. Practically no job is too specialised for us to produce quickly and at a competitive price.
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A recent photo of stainless steel sterilizers made by Giusti and supplied to the M.W.B. Bacteriological Laboratories 25 years ago. (*Photo by courtesy of the Metropolitan Water Board*)

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CBC C21

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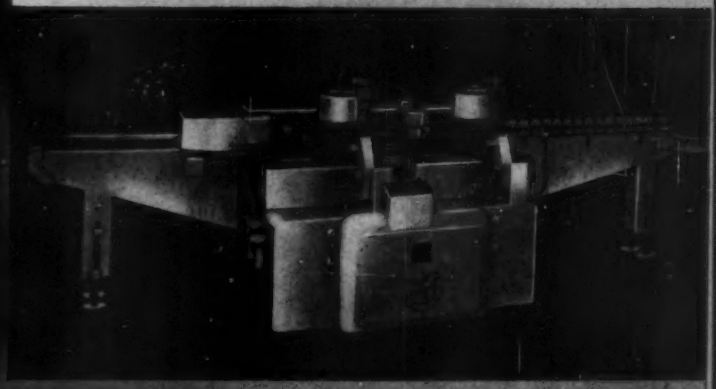

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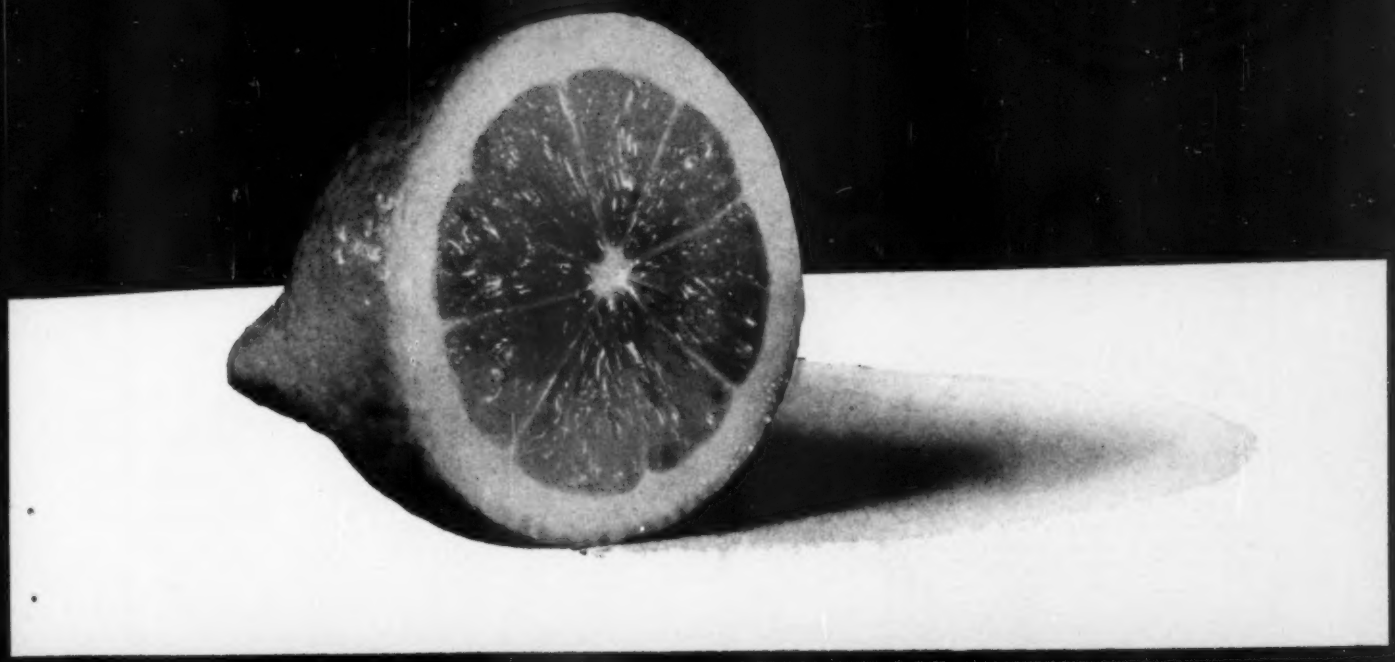

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for the busy dispenser

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- Incorporating a Polythene and parchment barrier.
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This NEW box

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Perfectly suited to hold powder. tablets, ointment or cream, the A.P.D. is invaluable when duplication of stock boxes must be kept to a minimum.

introducing the A·P·D

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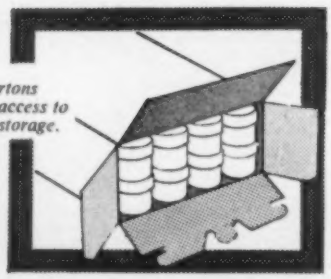
All A.P.D. boxes are packed in spill-proof cartons specially made to give easy access to contents and for convenient storage.



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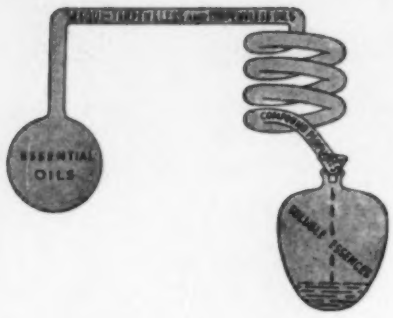

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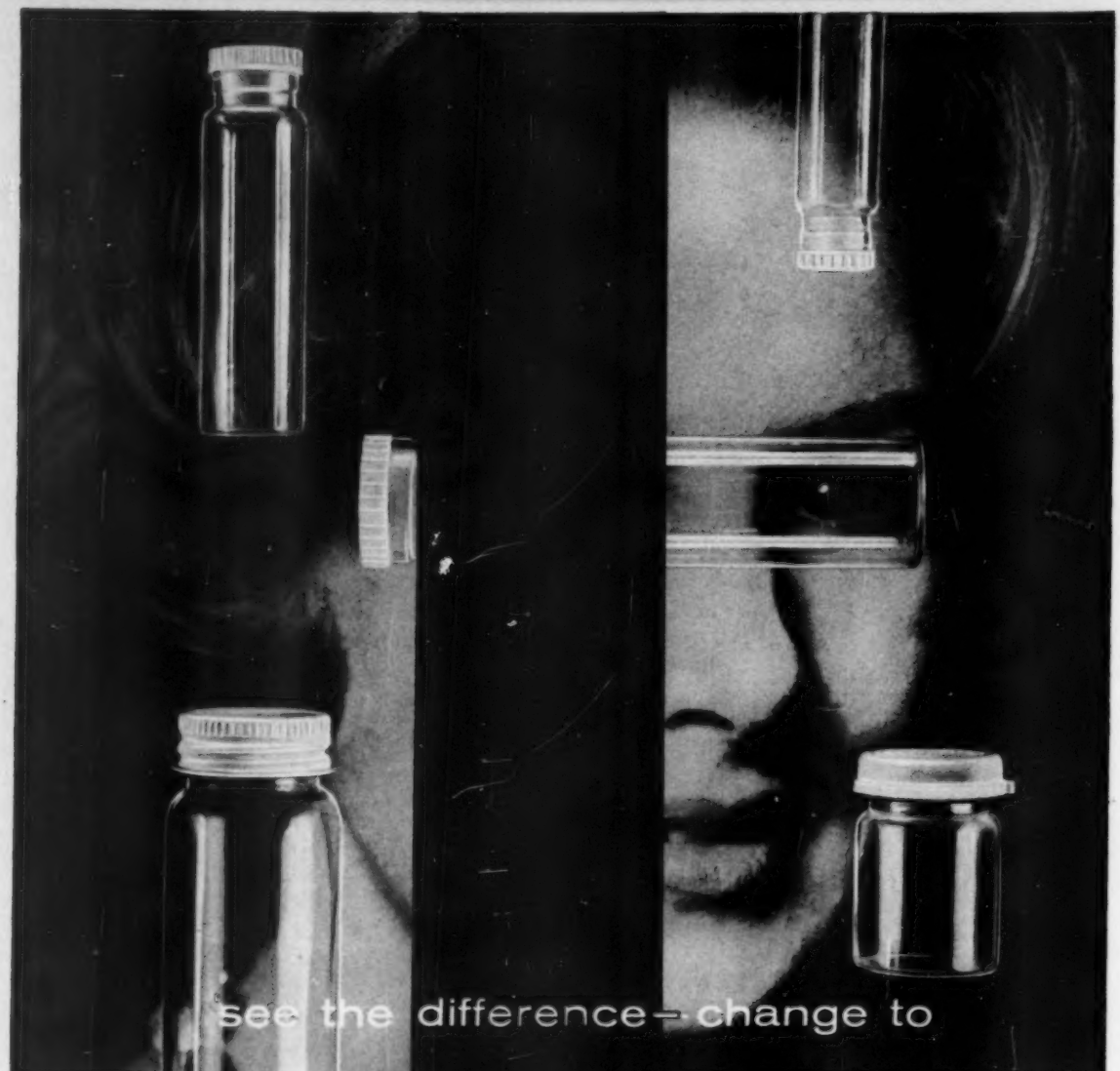

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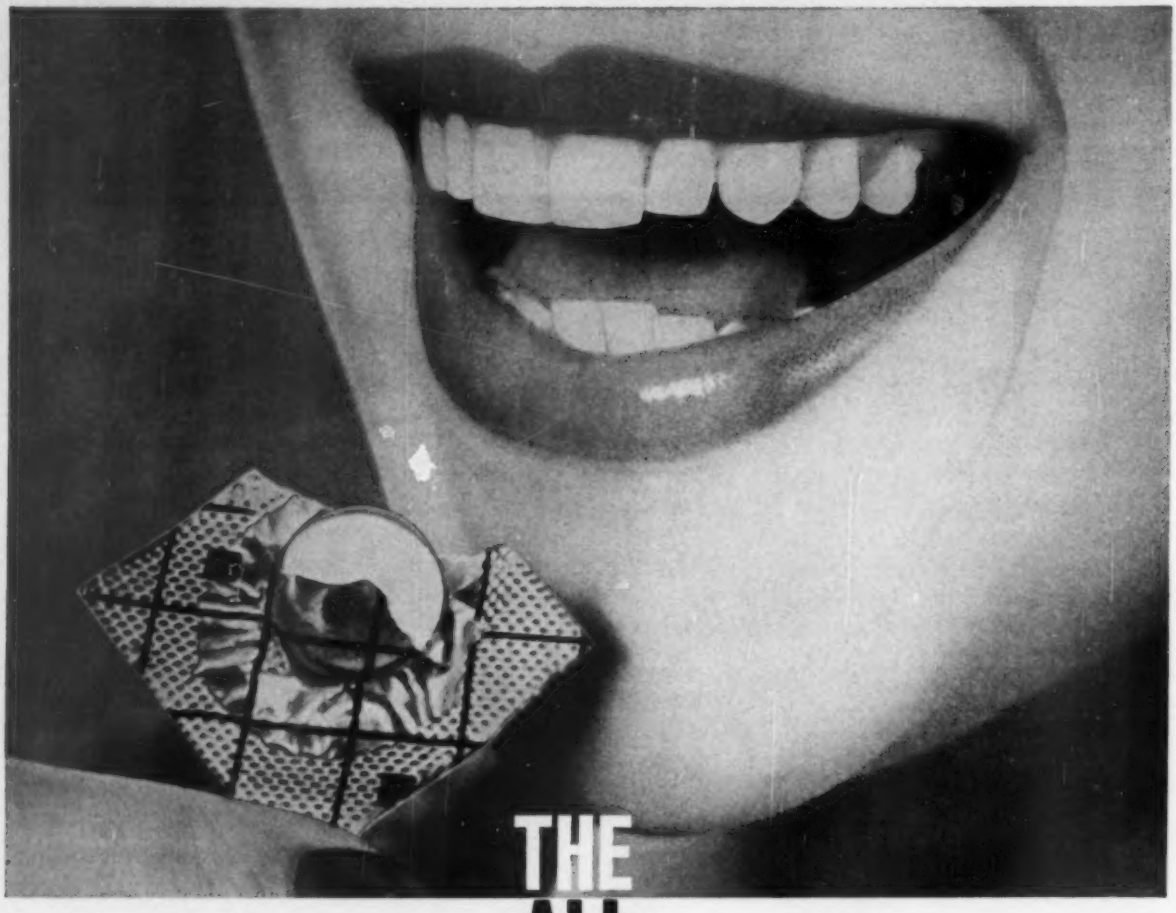

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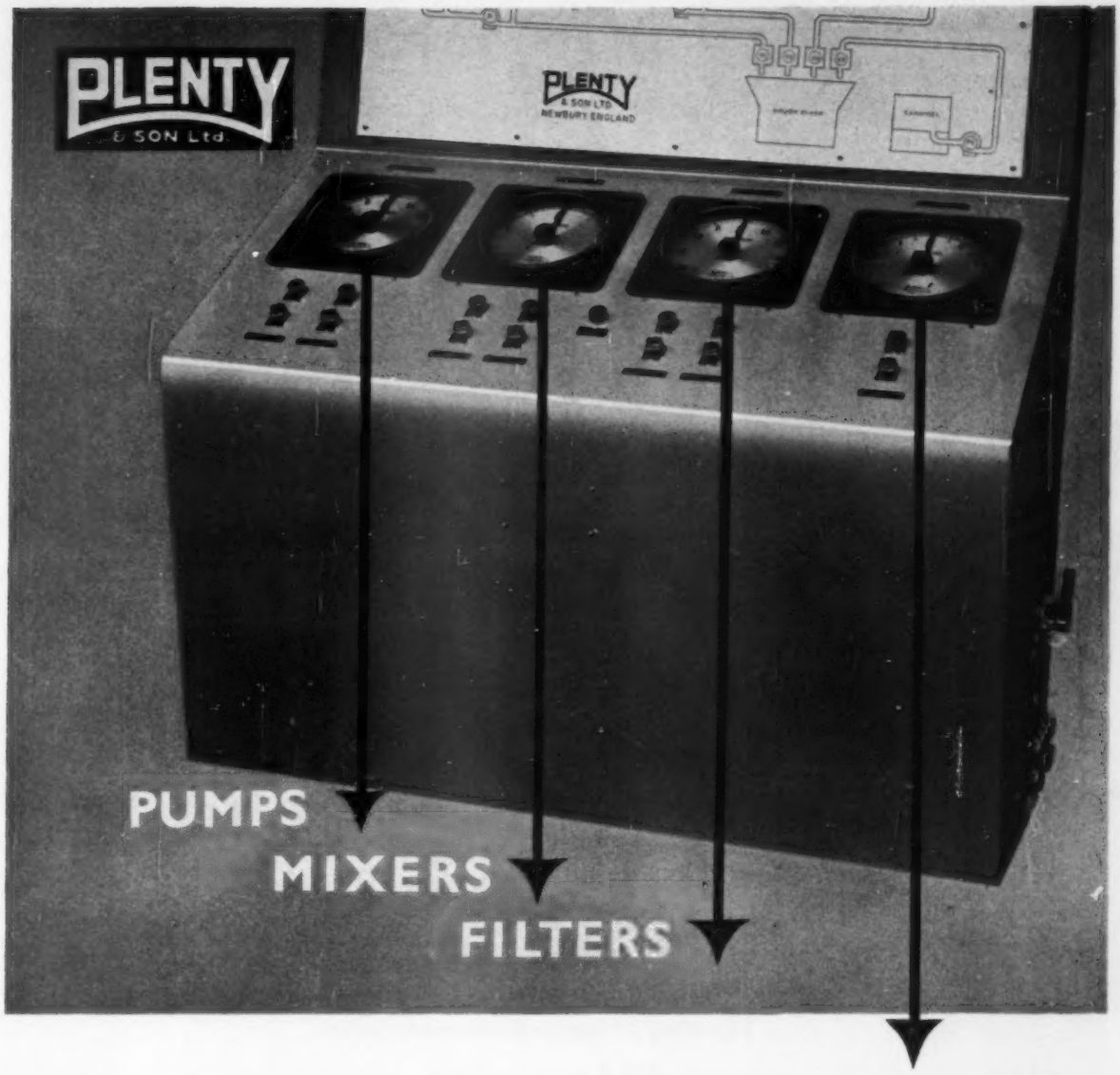

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Samples available on request.

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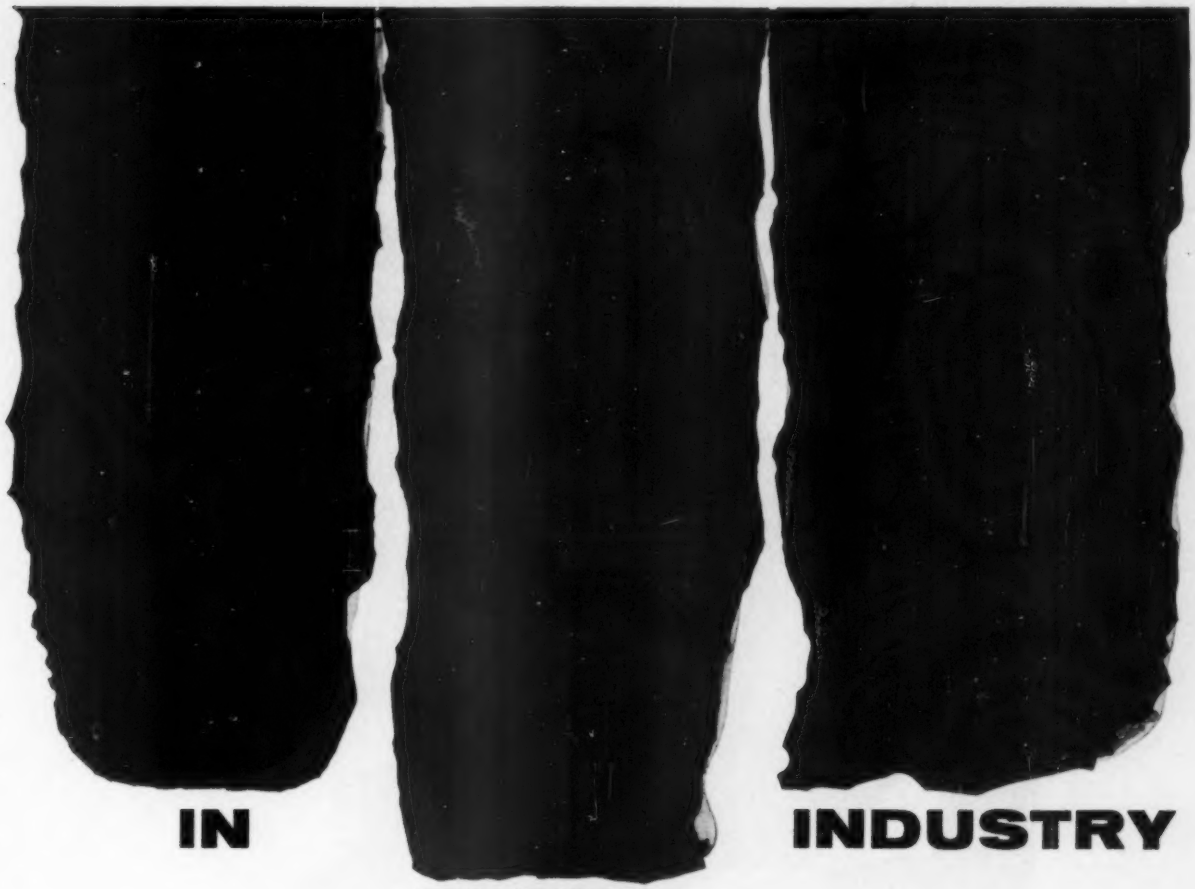

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TAS/JD20

✳ STARPACKS 1960

Metal Box Plastics Group packs won these awards

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GOLD STAR Laminated pockets for Heinz soups.
Manufacturer, and functional designer.

SILVER STAR Laminated pockets for Batchelors soups.
Manufacturer, and functional designer.

SILVER STAR Metathene pack for Twinings Caterers' Coffee.
Manufacturer, and functional designer.

Certificates of Merit Metathene sachets for Amanda soft drinks.
Manufacturer, functional & graphic designer.
Laminated pockets for Knorr soups.
Manufacturer, and functional designer.
Metathene pockets for Danish Bacon.
Manufacturer, and functional designer.
Densothene high density polythene film pack for Mac Fisheries Kipper Fillets.
Manufacturer, and functional designer.
Laminated pockets for County soups.
Manufacturer, and functional designer.

Pharmaceuticals and Cosmetics

GOLD STAR Poly-Tainer plastic bottle for Silvikrin. (*Retail Consumer Pack Supreme Award.*) *Manufacturer of container.*

Paints, Cleaning and Protective Materials

SILVER STAR Poly-Tainer plastic bottle for Quix. *Manufacturer, and designer in collaboration with Crosfields (C.W.G.) Ltd.*

BRONZE STAR Poly-Tainer plastic bottle for Lux Liquid. *Manufacturer, and designer in collaboration with Lever Bros. Ltd.*

Certificate of Merit Poly-Tainer plastic bottle for Kleenoff.
Manufacturer, and functional designer.

METAL BOX PLASTICS GROUP
PLASTIC FILMS · LAMINATIONS · BOTTLES · MOULDED CONTAINERS

THE PLASTICS GROUP OF THE METAL BOX COMPANY LTD · 37 BAKER ST · LONDON W1

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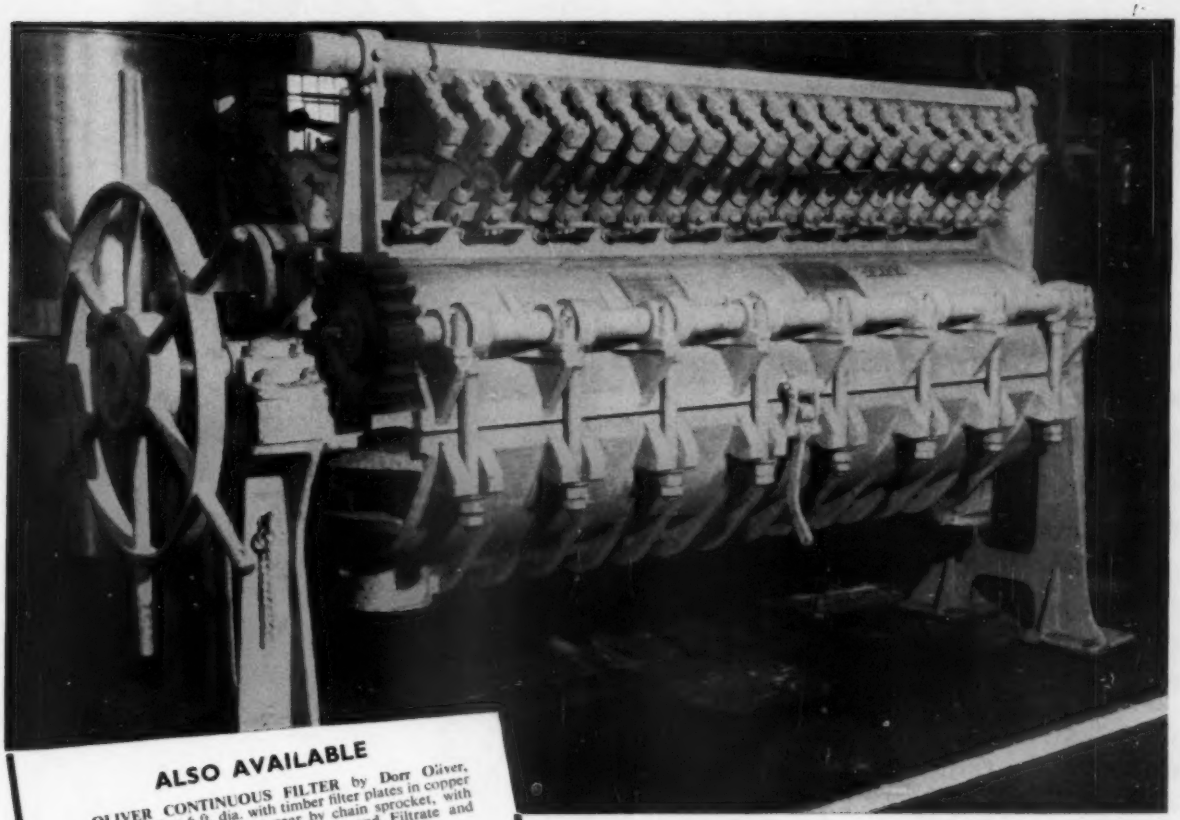
AVAILABLE FROM STOCK



ALSO AVAILABLE

OLIVER CONTINUOUS FILTER by Dorr Oliver, four rotating discs 6 ft. dia. with timber filter plates in copper trough, driven through worm gear by chain sprocket, with Dry Vacuum Pump, Centrifugal Pump, and Filtrate and Wash Water Receivers.

OVERDRIVEN HYDRO EXTRACTOR by Watson Laidlaw, 48 in. dia. F.M.B. grade stainless steel basket 21 in. deep with $\frac{3}{16}$ in. perforations, stainless steel dividers making four compartments, hinged lid with interlock, mild steel monitor with 6 in. flanged runoff. Direct drive from over-mounted motor.

TWIN-CYLINDER DRYING MACHINE by Simon, 82 in. long × 28 in. dia., complete with gearbox, vee belt drive by 15 h.p. motor and starter, grinding knives, and available spares.

TWO TWIN-ROLL BUFLOVAK DRIERS by Consolidated Products of U.S.A., rolls 100 in. × 32 in. suitable 100 p.s.i. w.p. Drive through reduction gearbox from 5 h.p. 400/3/50 cycles motor. Roll speed approx 5 r.p.m., take off speed approx. 40 f.p.m. Fitted adjustable scraper knives and aluminium hood.

COMPLETE EVAPORATING PLANT by A.P.V., comprising copper shell Calandria with stainless steel contact, stainless steel flash chamber and balance tank, steam jacketed stainless steel finishing pan, barometric condenser, vacuum pumps and all fittings.

TWO MILD STEEL HORIZONTAL JACKETED AUTOCLAVES by Lennox Foundry, 4 ft. dia. × 4 ft. 6 in. long on straight with 9 in. dished end, of $\frac{3}{8}$ in. and $\frac{1}{4}$ in. plate construction. Swing door one end. Supported on two mild steel cradles, with pipework, valves and control panels, 10 in. × 10 in. Vertical Wet Vacuum Pump driven by 5 h.p. 415/3/50 cycles motor, Water Circulating Pump direct driven by 1½ h.p. motor.

THREE LOCKER ROTEX type 22 **SINGLE DECK TOTALLY ENCLOSED SCREENS**, screen area 40 in. × 4 ft. 8 in. long fitted woven wire brass cloth. Timber top cover with inlet chute and rubber inspection covers. Driven by 1 h.p. motor with starter. Mounted on fabricated mild steel framework.

OCTAGONAL DRYING DRUM, approx. 82 in. across flats × 39 in. wide with 39 in. × 23½ in. feed opening secured by 14 swing bolts. Drum of welded mild steel construction driven by 3 h.p. motor. With Sturtevant No. 1 motorised Blower and Heating Chamber, cyclone, and ancillary equipment.

No: 7 SWEETLAND PRESSURE FILTER by **Dorr Oliver,** filter body cast iron construction, 2 ft. 1 in. dia. × 6 ft. 10 in. long internally, 20 mild steel woven wire leaves spaced at 4 in. with sight glass connections, suitable 50 p.s.i. w.p.

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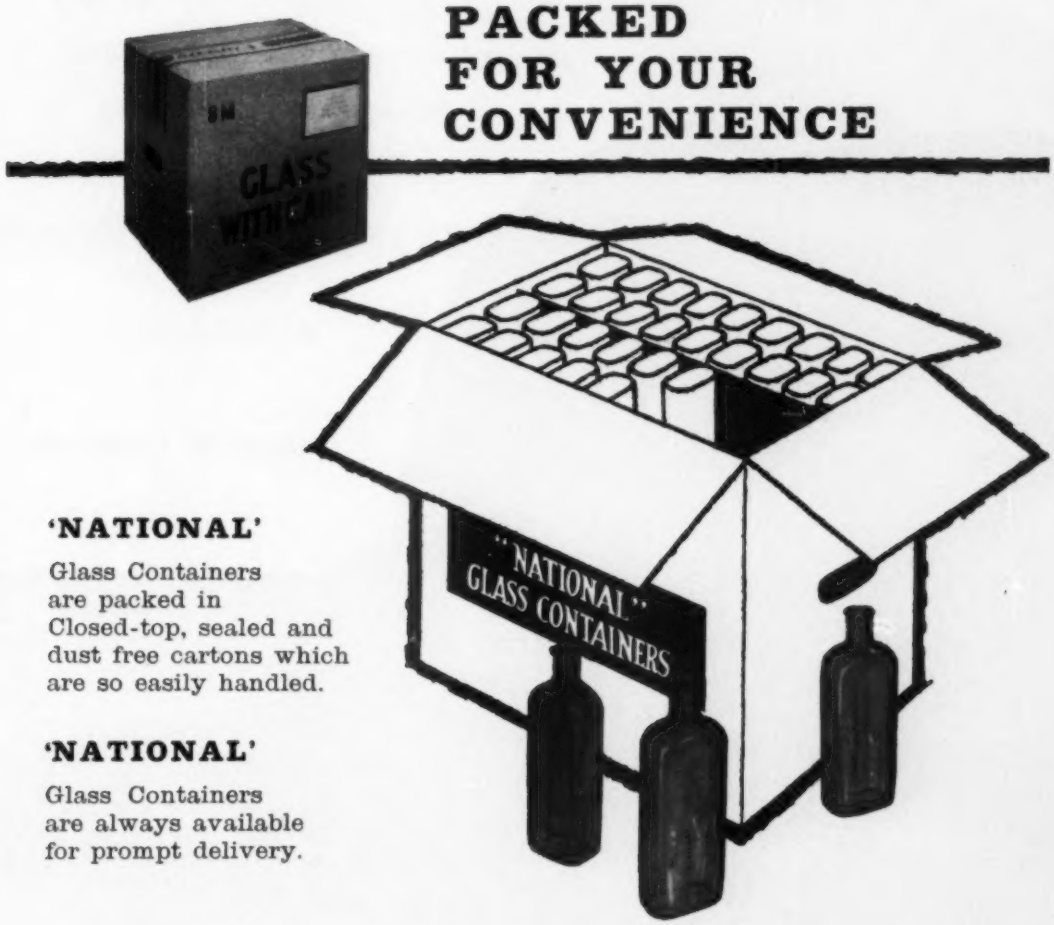

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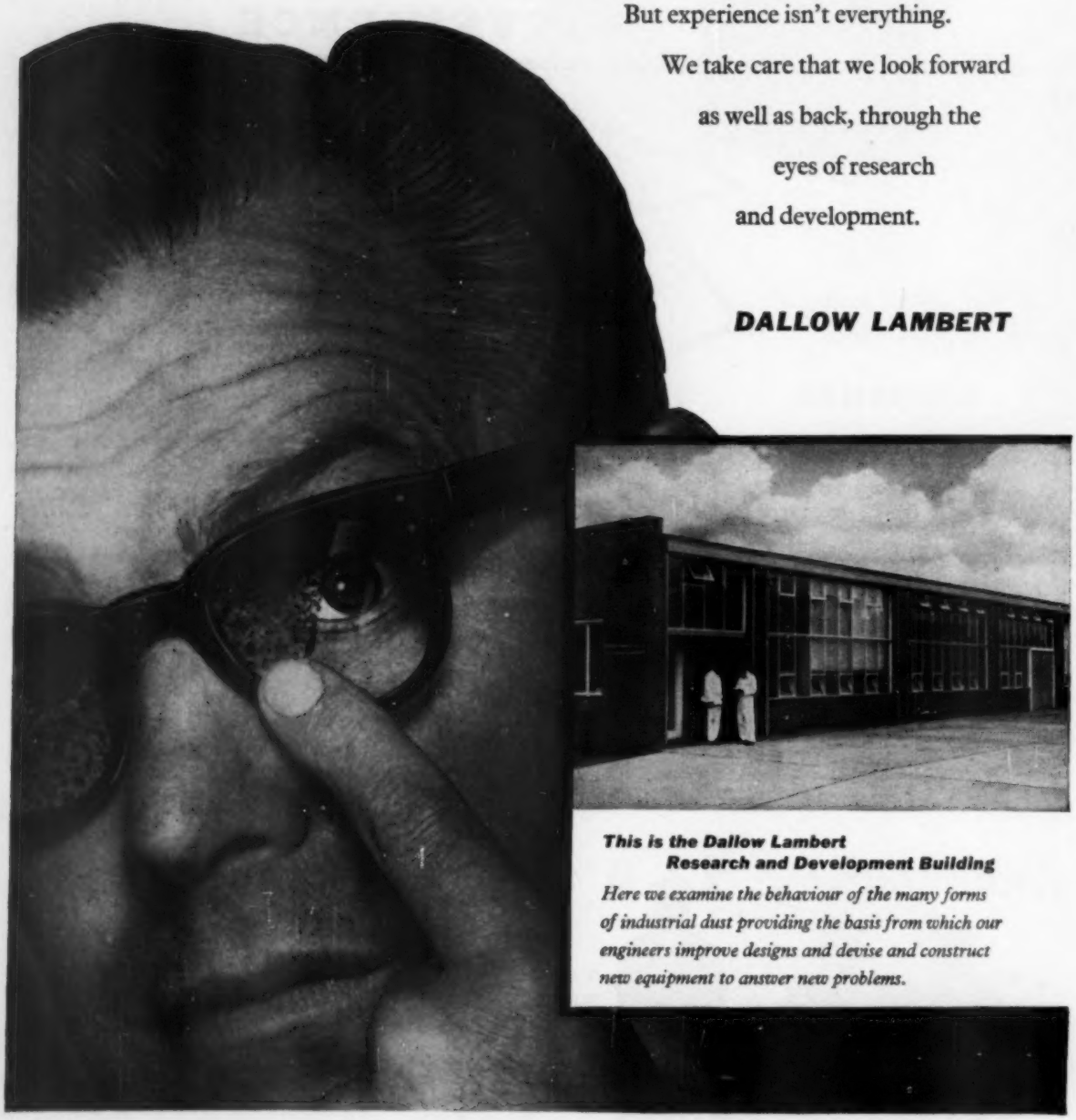

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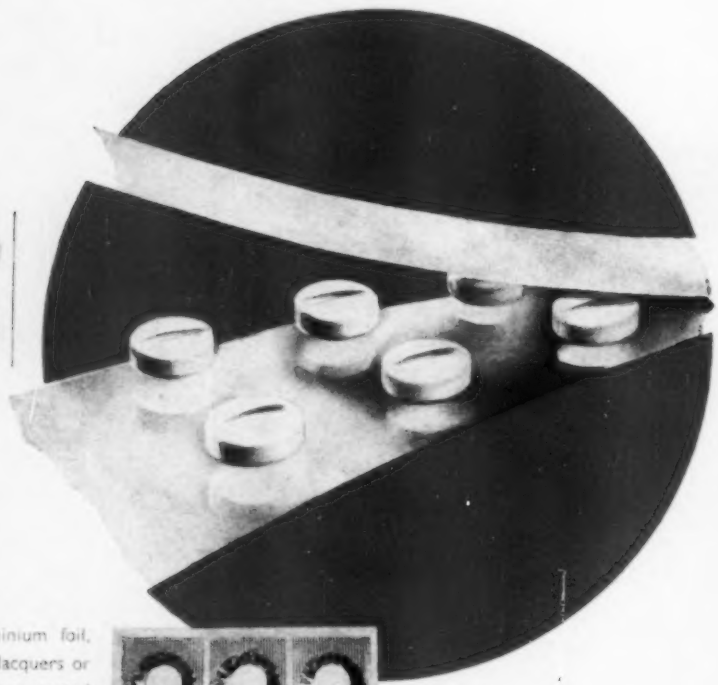

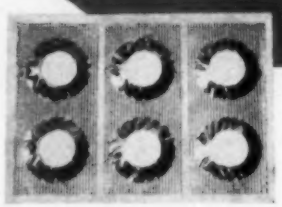

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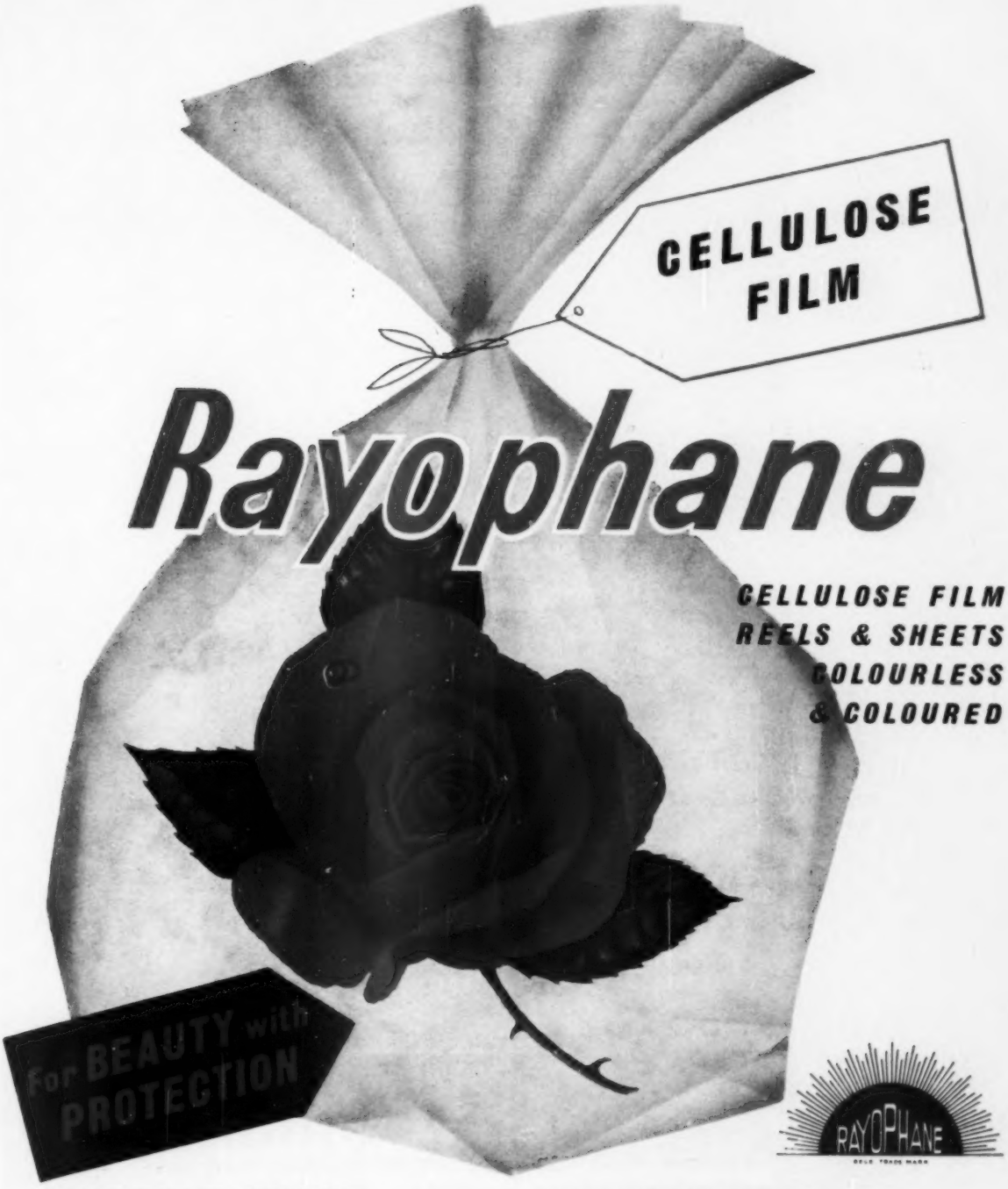

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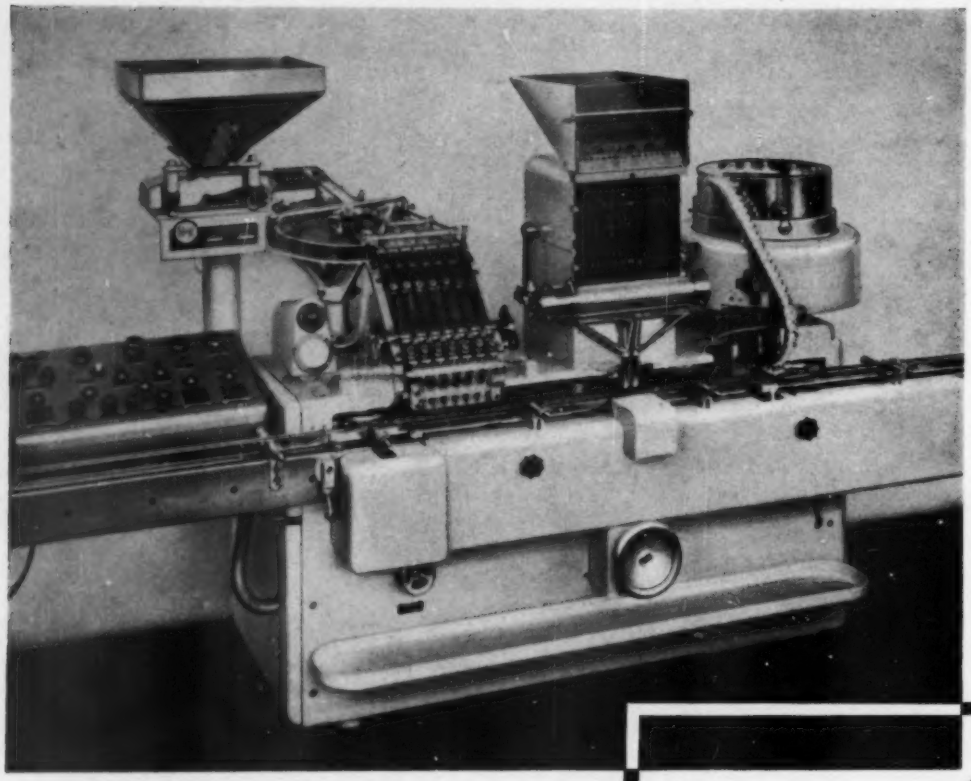

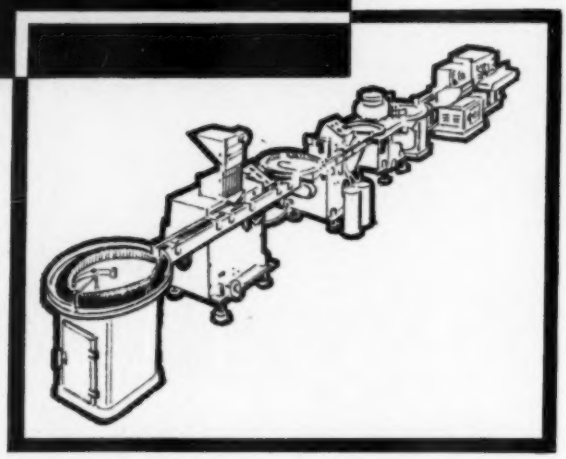

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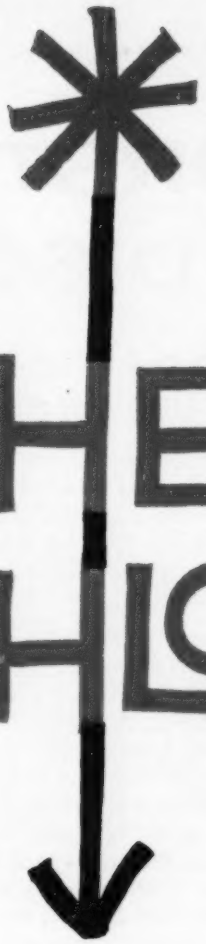

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Clear and colourless		
Free halogens		not detected
Specific gravity at 15.5/15.5°C		1.502
Distillation range (5—95%)		0.3°C
Residue on evaporation at 110°C	%	<0.001
Moisture H_2O	%	0.023
Acidity as HCl	%	0.0001

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Delanium

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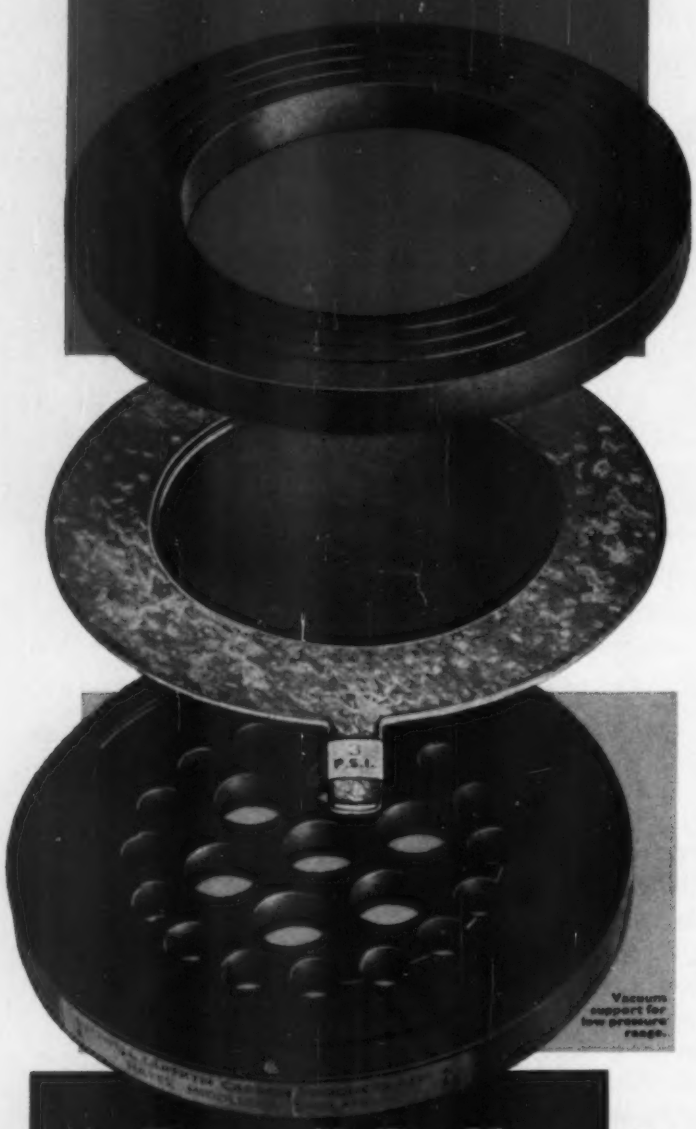

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RANGE OF DISCS AND PRESSURES	
Orifice Diameter	Bursting Pressure psig
1 in.	20-400
2 in.	4-200
3 in.	3-150
4 in.	2-100
6 in.	1-75
8 in.	1-40
10 in.	1-30
12 in.*	1-25

* Larger diameter discs on application.

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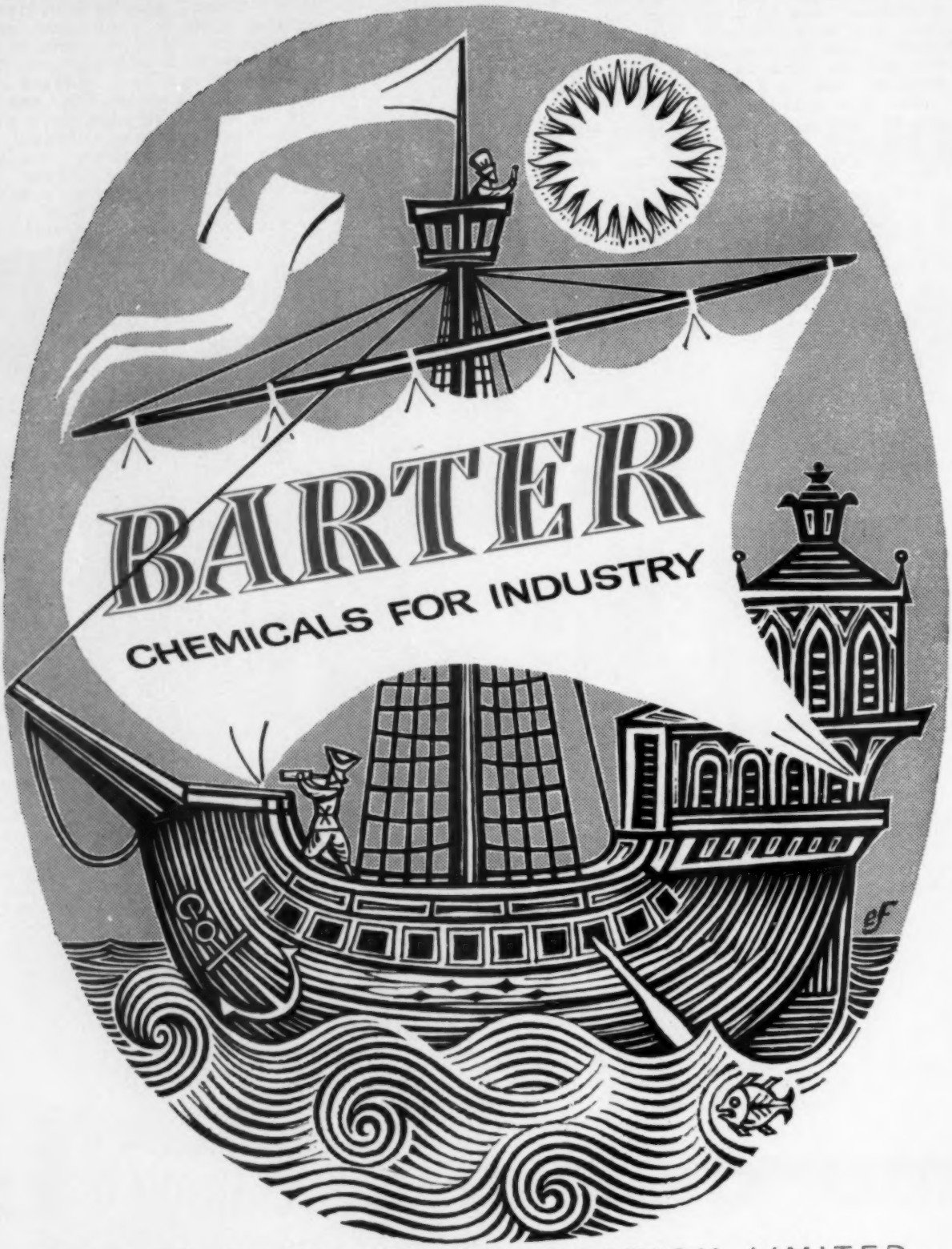

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Topics and Comments

Fair prices

WHILE the new price regulation scheme for Health Service drugs is not exactly a straitjacket it is a tighter fitting suit than the 1957 model. The Minister of Health, Mr. Enoch Powell, has made a cut here and a tuck there to make the suit pinch in some vital spots. Perhaps the most important change is the revision of the definition of a new drug. For the first three years new drugs are exempt from control and this has led to a multiplicity of relatively minor formulation changes in order to make an old product "new." The Ministry of Health will now scrutinise new products much more closely to exclude those which manifestly owe nothing to fresh research. If this saves money and at the same time reduces the number of new formulations it will do two good jobs at once. It will also be a good thing if more money is spent on genuine new product research rather than on playing about with formulations.

Another important change is that the percentage of sales that must be exported before the export price can be used as the maximum price for a particular product goes up from 20 to 25. However, there is a bonus for good exporters: where a firm's total exports amount to at least 25% of total production, a single preparation may qualify at 20%.

The formula which fixes the maximum price for products which do not satisfy the export criterion and for which there are no exact unbranded equivalents, is revised so as to result in lower maxima.

Finally, provision is made for the Minister to call for direct negotiations about prices on some widely used drugs which are patent protected and for which export prices may not be competitive. The old scheme allowed for direct negotiation only at the manufacturer's option.

So, with these four revisions the original scheme continues from January 1, 1961, to June 30, 1964. The industry has renewed its undertaking that prices will not, save exceptionally, be increased where they are below the maxima indicated by the formulæ.

The new scheme should satisfy the more reasonable critics of drug prices while at the same time avoiding the penal reforms advocated by the ill-disposed fringe of critics who apparently refuse to see anything good in the existence of a private drug industry side by side with a public health service. For instance, it does not require disclosure of profit margins or of the costs of advertising, except where these may be factors in direct negotiations about price. The Association of British Pharmaceutical Industry have volunteered to provide additional information on these points.

The Minister has thanked the A.B.P.I. for helping to work out the new scheme. The A.B.P.I. president, Mr. Herbert Palmer, says it continues to encourage pharmaceutical exports—now running at £40 million p.a.—and the research effort—now £6·25 million p.a.—essential to the advancement of medicine. "It reflects our desire to provide the Ministry of Health with acceptable evidence of the fairness and reasonableness of the prices charged for our products." Like Cæsar's wife, the industry must be above suspicion. Its conduct must not only be fair but manifestly seen to be fair.

On prices it has an excellent record. The wholesale price index for pharmaceuticals has risen since 1954 by only 1·01%, whereas all manufactured products have risen by 12·94%. The total amount received by manufacturers for drugs remains less than 7% of the cost of the Health Service.

This is a splendid record which the industry must never fail to publicise. What is more important is that the efficacy of its products continues to improve so that the actual value given is much better than ten years ago. How many other industries can say the same?

The pharmaceutical revolution

THE extent by which pharmaceutical research has revolutionised medicine in the last 20 years is never properly appreciated by those critics who are obsessed with prices and profits. The pattern of progress is etched most sharply in America not only because it has the biggest drug industry in the world but because it produces more statistics than any other. A few months ago Mr. L. W. Frohlich of New York gave a paper at the Royal Society of Medicine in which he pointed out that prescription costs in the U.S. had risen from $250 million in 1939 to $2,250 million in 1959; the range and specificity of the products had increased even more.

The 1955 U.S. Pharmacopœia contained 250 names not present in that of 1950, and the 1960 edition gave even more. A great many of these preparations have opened up entirely new therapeutic fields. The corticosteroids, the tranquillisers, the psychic energisers, etc., are essentially the products of the last decade, providing new approaches to many diseases for which there was no effective treatment ten years ago.

The U.S. pharmaceutical industry has developed and introduced over 400 new products since 1950—a new product almost every week. Even where a particular category did exist 15 years ago, the drugs within that category prescribed today are apt to be recent developments. For example, about 45% of those people now receiving drug therapy for diabetes are on oral anti-diabetics instead of insulin.

These achievements have cost a lot of money. The industry has spent $600 million on research in the past four years. This comes to about 7·5% of

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These achievements have cost a lot of money. The industry has spent $600 million on research in the past four years. This comes to about 7·5% of

sales for the period. In 1960 it is estimated that $200 million was spent, comprising about 9% of sales. This is probably unparalleled by any industry at any time. An immense percentage goes into basic research—so much that the line between basic and applied research is becoming a bit blurred. Basic research is generally regarded as work with the primary objective of adding to scientific knowledge without regard to economic results. Prior to the war it was done exclusively by universities and research organisations, but today it is generally regarded as a sound investment by all rapidly expanding industries. For the pharmaceutical industry—and fortunately for the public—it is imperative for survival.

A brilliantly successful show

THE most convincing demonstration ever staged of Britain's supremacy in the technical battle against corrosion was the Corrosion and Metal Finishing Exhibition held last month at Olympia under the auspices of our associated journal, *Corrosion Technology*. The Exhibition was given a fine send-off by the President of the Society of Chemical Industry, Sir Alexander Fleck. During his speech he held aloft an 11-inch nail which, he revealed, was one of a cache of 12 tons recently unearthed at the site of the legionary fortress at Inchtuthil, Scotland. These nails, buried by the Romans when they evacuated the northern frontier, some 2,000 years ago, had resisted rust to an astonishing degree for all this time. How and why? This was a corrosion conundrum that the scientists are still trying to elucidate.

From the ancient to the modern in corrosion technology displayed at the Exhibition: here was a remarkable array of paints, coatings, plastics, rubbers, metals, fluids, packings, pipes and plant designed to resist corrosion and relieve the burden of the £600 million a year corrosion bill that weighs on the country. That the problem is urgent and serious was abundantly shown by the number and nature of the visitors. They came in their thousands from all parts of Britain and from 25 countries overseas. For four days Olympia was the world focus of corrosion prevention. Exhibitors reported hundreds of enquiries and orders and some had to call for additional staff to cope with the visitors.

The Exhibition was enhanced by technical meetings held by the Plastics Institute and the Corrosion Group of the Society of Chemical Industry. Sir Alexander Fleck had an especially warm word for this arrangement between the societies and the organisers whom he referred to as "our good friends the Leonard Hill Technical Group." Films on many aspects of corrosion and its control were also shown.

The Exhibition had a remarkably good press with hundreds of stories printed in newspapers and technical journals up and down the country and broadcast by the B.B.C. The battle against corrosion made a truly national impact, the benefits of which will be permanent.

The next Corrosion and Metal Finishing Exhibition will be held in the National Hall, Olympia, November 27-30, 1962. Already nearly 20,000 sq. ft. of stands have been reserved, mainly by regular exhibitors. Every effort is being made to accommodate new exhibitors and enquiries should be sent to: The Director, Corrosion and Metal Finishing Exhibition, 9 Eden Street, London, N.W.1.

Biogeochemistry

A NEW technique of geological surveying has been introduced which depends on the study of surface plant life as a clue to underlying ore deposits. Different plants are affected by different minerals underground. According to a recent article in *Science* the idea was not really accepted until 1938 when enough data had been compiled, but by 1955 the new science, geobotany, had progressed so far in Russia that it was routine to use such studies on all exploratory trips.

Plants growing over mineralised ground tend to be abnormal in colour, shape and pattern. Some plants react consistently to certain minerals in different parts of the world, but others vary, depending on the acidity and sulphur content of the soil and the presence of other minerals. Once sufficient information is built up regarding botanical reactions, "indicator plants" which exhibit specific reactions to specific minerals can be set up as standard references.

Indicator plants are called "universal" if they always indicate the presence of a given element, and "local" if they act as indicators only within a limited region. Some 32 plant species have by now been used widely enough to rank as reliable indicators. Another 60 to 70 plants have been observed to prefer mineralised soil, but data are so far inadequate.

Certain abnormalities in the cycles of flowering, growth and development of indicator plants are of particular importance. For example, in boron-mineralised ground some plants become enlarged two or three times their normal size; their leaves get greener than normal, and some tend to creep in an unusual way. Aluminium causes stubby roots and scorched and mottled leaves; chromium, yellow leaves with green veins; and nickel, white dead spots on leaves. Tests in the United States show that uranium has drastic effects on stamens or seeds, and different sizes and shapes of fruit and unusual ranges of colour are exhibited.

Prospecting by biogeochemistry—chemical analysis of plants—is particularly useful where ore beds are buried at great depths, or where rock formations obscure mineralised beds. Samples of plants, ranging from grasses to trees, are usually analysed by spectrographic and colorimetric tests. The plant to be tested is selected by the depth and penetration of its roots, age, height and the "accumulation ratio" which indicates how much more of a given mineral is absorbed when the plant grows over an ore body than when it does not.

Fraudulent packs

As a nation of shopkeepers we are very keen to get value for money, so it is not surprising that we spend so much time worrying about weights and measures. It is a favourite topic in Parliament and M.P.s find that a scathingly critical speech about the iniquities of manufacturers and shopkeepers is a more certain road to constituency popularity, indeed national fame, than a dozen well-planned speeches on foreign affairs.

Recently the House of Commons deliberated on the variability of the contents of a common teaspoon. How much is a teaspoonful? They did not seem very happy when they were assured that manufacturers realised it was a somewhat arbitrary measure and took account of that in fixing the therapeutic dose.

Recently too the House of Lords considered the Weights and Measures Bill. This contains two important requirements: firstly the contents of a container or package should be marked, and secondly goods must be sold in specified weights. These requirements are overdue: a new cold cure tablet is sold in packs that have no indication whatever of the quantity or price.

But Lord Shepherd wanted to amend the Bill to give the Board of Trade powers to prohibit the use of containers that falsely or misleadingly suggested that they contained more than was actually present. He instanced a pot of face cream with a false bottom. Other peers who supported him instanced other cosmetics and, inevitably, the "giant" detergent carton.

We suggest that neither of these examples constitutes deception of the kind implied. Cosmetics are luxury goods and it is obvious that they sell as much by their pack as by their contents. Women expect fancy packs and certainly do not buy cosmetics in the same way they buy a pound of butter. As for the detergent pack, surely their Lordships realise that when a carton is filled with powder there is bound to be settlement, leaving a headspace.

This is not to say we approve of deliberate deception. We simply think the examples are poor ones. We thoroughly agree that manufacturers who trade by deceit offend not only the consumer but the honest manufacturer too. The two provisions in the new Bill should be sufficient to prevent fraud. If they are not enough the consumer has his own remedy; don't buy the deceptively packed goods again.

Complexities of the Coss

While on the subject of weights and measures we ponder on some of the difficulties that arise when an international industry such as the chemical industry is faced by conflicting systems of weights and measures. For the technical press this is particularly difficult when deciding whether to present figures in long or short tons, the metric system, feet, pounds, or whether one standard is more appropriate than another.

However we have to admit that things could be a great deal worse. While browsing through Khosla's "Industrial and Commercial Directory of India, Pakistan, Burma and Ceylon," we found the following extract from the "Indian Weights and Measures" section of great interest, not least for the mathematical problems it poses.

"The *Coss* or Bengal mile is equal to 1 mile, 1 furlong, 5 poles, 3½ yards English.

"The Indian Imperial *Coss* is equal to nearly 2¼ miles.

"In the United Provinces the average is about 2 miles, but it varies with locality. In Agra and Muttra the *Coss* is about 1¾ miles; towards the hills the *Coss* is fully 1 mile, in Bundelkhund three times as much as in some other parts, and is called a *Pucca Coss*. While in the Duab the *Gow Coss* is current, or as far as the lowing of a *gow* can be heard at the dead of night."

Phew!

Idiots and antibodies

A somewhat startling Russian contribution to the study of the influence of the brain on disease postulates that the ability of the body to produce antibodies against disease germs is influenced by the brain and is changed by mental disease. Thus reported Dr. O. V. Kerbikov, head of psychiatry in the Second Moscow Medical Institute, at a conference on Pavlovian physiology and psychology sponsored by his academy and the New York Academy of Sciences, in New York.

Catatonic schizophrenics, patients whose overt behaviour is typically non-reactive, are similarly non-reactive to the introduction of toxins of tularemia and a common staphylococcus. Patients with Parkinsonism which had been the sequel to encephalitis (in which lower brain levels are damaged) also produced fewer antibodies against the inoculations than normals.

On the other hand, patients with virtually no top-of-the brain function (so-called idiots) produced high levels of antibodies. "Like having babies," Dr. Kerbikov said; "you don't need intelligence to do it."

None the less, he suggested, to react adequately to the challenge of an infection, a normally functioning lower brain—those areas which maintain body temperature, blood flow, respiration—appears to be of importance.

As further support for this conclusion, Dr. Kerbikov cited experiments he had conducted to record the effect of central-nervous-system drugs on the body's ability to produce antibodies. The tranquilliser, chlorpromazine, enhances antibody production, but only after a lapse of 8 to 12 days.

Dr. Kerbikov offered as a possible explanation the observation, made by others, that narcosis and so-called "curative sleep" induced with drugs may inhibit antibody production.

In chlorpromazine therapy, he pointed out, there is an initial period in which the drug has a somnolent

rather than a tranquillising effect. This period of chlorpromazine-induced somnolence corresponds exactly, he said, with the eight-to-twelve-day time lag in stimulation of antibody production.

The experiments on which his report was based took place over the last five years and involved 726 patients.

Red antibiotic?

THE first total synthesis of prodigiosin, a red pigment derived from *Seratia marcesens*, may open the way to the production of new antibiotics for the control of fungus diseases. The synthesis, reported in the *Journal* of the American Chemical Society, was carried out by Dr. H. Rapoport and K. G. Holden at the University of California. The pigment has been known since the Middle Ages when the appearance of red spots on sacramental bread was interpreted as blood spots resulting from heresies.

Recent interest in the compound centres round its strong antifungal activity. It is the only material known so far that is effective against the fungus that causes San Joaquin Valley fever, but its high toxicity precludes its use as a drug. Now, with the structure established and a synthetic technique available, derivatives can be produced which are less toxic but still retain the antifungicidal properties.

Previous work on prodigiosin had reduced the structural possibilities to two. The key to the synthesis was a cyclisation reaction which gave an ethyl methoxypyrrolecarboxylate with a specific structure. This compound was then condensed—first with 1-pyrroline and then with a substituted pyrrole—to give prodigiosin. A significant feature of the structure is the 2,2'-bipyrrole skeleton. The only other instance of the occurrence of this structure in a natural substance is in vitamin B_{12}.

Plastics versus waxes

MORE changes have occurred in polish formulation in recent years than with any other floor maintenance material. This has been due to the introduction of new types of floors and floor covering material.

The traditional wax polishes consisting of dispersions of compounded waxes in a solvent, such as white spirit or turpentine, are obviously not suitable for application to materials which are softened by the solvent, but aqueous emulsions of suitable waxes can be used. Both polishes, however, have the disadvantage that even if a slight excess is applied the floor may become slippery and the wax film tends to become unsightly from ingrained dirt unless periodically cleaned off.

Although the slipperiness of wax emulsion polishes has been reduced, mainly by the incorporation of colloidal silica, the more slip-retardant products rapidly become unsightly because dirt adheres to the slightly tacky surface. During the last two years a new type of emulsion polish has been developed by several manufacturers. This is compounded by blending emulsified plastics such as polythene, polystyrene and acrylic resins. These water-plastic emulsion polishes have a thin milky consistency, are easily applied and dry within two minutes to give a thin plastic film. The film is glossy when built up by two or three applications but is non-slip and extremely long wearing, even with hard use. Since these plastic polishes can be used on all types of floors which are normally polished, including wood after sealing, they are likely to revolutionise floor maintenance.

Something new for plants and packs

WORKING at top speed I.C.I. have put up their polypropylene plant (Britain's first bulk plant) in 16 months. It is now on stream with a capacity of 11,000 tons a year of this quite unusual plastic. Speed has been the essence of the operation. Montecatini have been licensing other manufacturers for the past few years and, once I.C.I. obtained a licence, there was no time to lose in turning out the new plastic. The plant is at Wilton, near the oil refineries that produce propylene.

The development of polypropylene stems directly from I.C.I.'s discovery of polythene 25 years ago. Ever since attempts have been made to polymerise other olefines. There was no success until Ziegler in Germany discovered his strange metal alkyl complexes and transition metal halides with the property of catalysing ethylene polymerisation at atmospheric pressure instead of the very high pressures and temperatures used in the I.C.I. process. Natta in Milan took up Ziegler's catalysts and modified them so that they catalysed the polymerisation of polypropylene, also at atmospheric pressure. The process was developed by the Montecatini company and since 1957 polypropylene has been produced in several countries.

Propathene (the I.C.I. name) offers a unique combination of desirable properties. It is the lightest of all commercial plastics, it has a high melting point (165°C.) which qualifies it for many applications where temperatures well above boiling water are used, and it is very tough and stiff—much stiffer than the best polythenes.

It is an excellent material of chemical plant construction. It resists attack by inorganic and organic liquids and withstands oils, fats and greases. So it is being used for chemical plant valves and closures, for pipework, and for lining and constructing chemical plant.

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The development price of Propathene is 3s. 4½d. per lb., against 1s. 10d. for polythene. But this price will quickly come down as production increases. One reason for polythene's cheapness is the fantastic rate of output—I.C.I. alone make 100,000 tons p.a.

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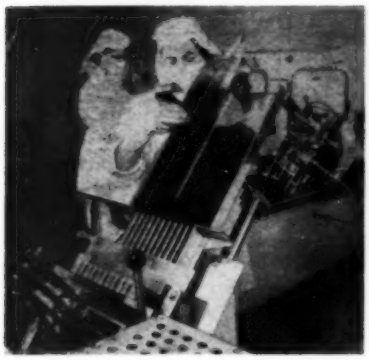

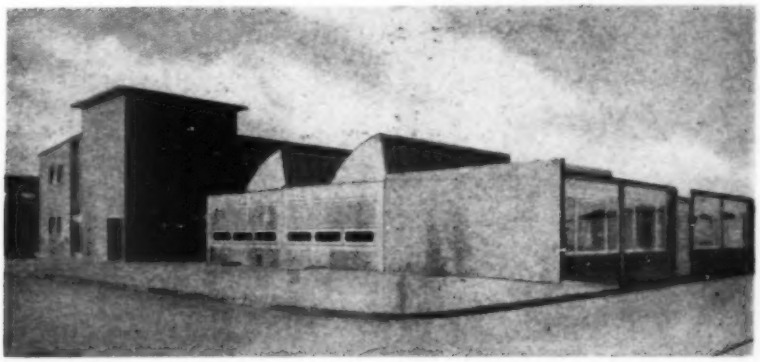

E. Merck's new factory seen from the north-east. It consists of a two-storey front part, followed on the north side by a single-storey factory hall. A continuous basement under the building houses the services plant.

Production of Injection Drugs by Merck of Darmstadt

By Dr. Heinrich Brass*

Since 1886, when the glass ampoule for sterile injections was invented simultaneously in France and Germany, there has been continuous development of this important form of pharmaceutical presentation. The most modern ideas and equipment for handling, filling, sealing and sterilising ampoules are employed in a new factory recently built at Darmstadt, West Germany, by the E. Merck Chemical Works. Here is a description of the factory.

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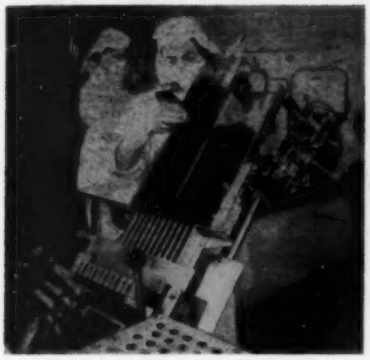

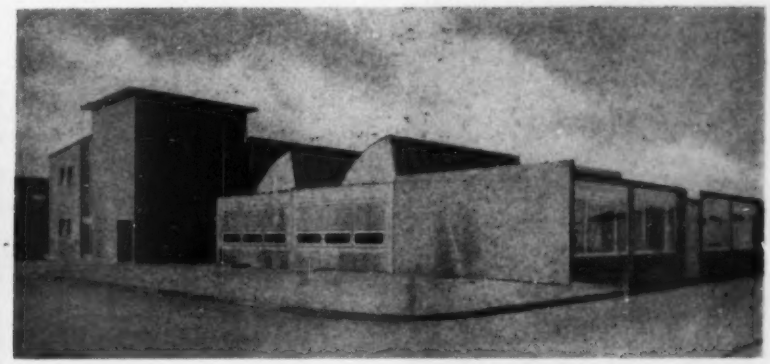

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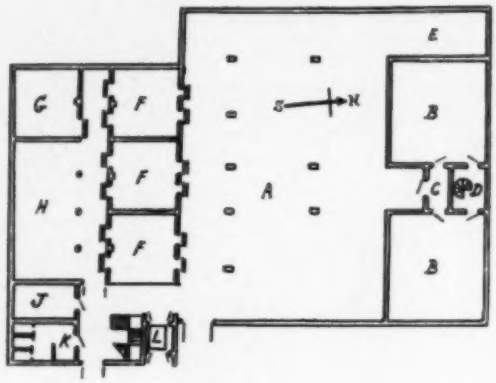

Left: Inserting machine and cleansing machines at the head of the line. Right: Ground floor plan of new building.

The building, which is sited roughly from south to north, consists of a two-storey front part, followed on the north side by a single-storey factory hall.

There is a continuous basement under the whole building, housing *inter alia* the power generation and distribution plant, a cold storage room, the water desalting plant, the air conditioning plant and, near the centre of the northern end, the chambers serving as locks through which the sterile rooms on the ground floor can be reached *via* a spiral staircase.

The upper storey of the front part of the building contains a laboratory, a room for the manufacture and sterile filtration of the drug solutions, and, adjacent to it, the rooms in which the vessels and implements needed for the manufacture are rinsed and washed.

Production lines

The part of the new building most important to this description is the ground floor. The main hall contains one production line for the continuous processing of ampoules, and another for the continuous processing of injection glasses (for repeated injections). The two production lines run parallel to each other in the main hall (Room A). From the hall they lead to the sterile rooms B which, in their turn, can be supplied and entered through the lock chambers C and D. The production lines then return to Room A. In the ground floor of the front part of the building are the inspection rooms F and the dispatch rooms G and H where the finished products are stored intermediately while the drugs are being tested.

Hall A receives daylight through four north-light roof units and through glass bricks and clear windows along the east wall.

The production line for injection glasses takes up the west side of rooms A and B and is linked with a mainly continuously operated chill drying plant. The production line for the continuous filling of ampoules is situated on the east side.

Production rates

The production line is designed for an hourly output of approximately 8,000 ampoules with a capacity range from 1 to 20 ml. If desired, this capacity might be increased, with more experience, by 2,000 to 3,000 ampoules/hr. by installing additional equipment at certain points, and increasing the speed of the belt, provided that purity, sterility and non-pyrogenity of the ampoules can be reliably obtained with shorter processing times. Modification of the working conditions is dependent on the characteristics of the drugs.

Sterilising empty ampoules

The different operations are based on the continuity principle and on the idea of preserving the initial arrangement of the ampoules; these operations are as follows.

The empty ampoules, which are as far as possible made in accurate sizes and are already opened on the drawing machine, are pushed out, still in a vertical position, from the cartons in which they have arrived into the magazine of the inserting machine. After introduction of a receptacle box for 100 ampoules, the inserting machine automatically places the ampoules into the receptacle. Immediately adjacent to the inserting machine are two automatic cleansing machines which are used alternately.

When the ampoule racks have been inserted in one of these machines, the ampoules are treated, successively, with hot water, compressed air, hot water, compressed air, salt-free water and again compressed air, injected under pressure of 2 to 3 atmospheres from several sets of 100 nozzles each. The length of time of each of these injections can be regulated, and the timing of the different cleansing phases is automatically controlled. This intensive cleansing process removes any dirt particles or glass splinters, unless the latter are smelted to the glass. After rinsing, the receptacles are introduced into the drying and sterilising tunnel.

Since all these processes overlap, one person can operate alternately the inserting machine and the cleansing machines, as well as the inlet of the drying and sterilising tunnel. The sterilising tunnel, which is about 6·3 metres long and ends in the sterile room B, is traversed by the ampoule racks on an endless VA type chain belt, normally in about 25 min. Using infra-red lamps, the ampoules are first heated in the drying zone to 270°C. and subsequently, in the sterilising zone, to 300°C. They then enter the cooling zone where they are cooled to room temperature using a jet of sterile-filtered air.

Sterile room

Having arrived in the sterile room, the ampoules are emptied by overturning the receptacles, and, standing on their flat bottoms, are transferred to V2A containers by means of caliper-like devices. The sterile rooms are equipped with a comprehensive air conditioning system, set for 28 air changes per hour, a temperature of 20°-

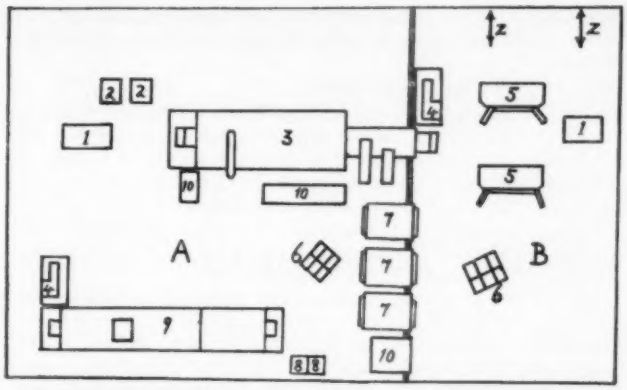

Diagram of ampoule production line. 1. Inserting machine. 2. Cleansing machine. 3. Sterilising tunnel. 4. Overturning device. 5. Filling machine. 6. Pallet truck. 7. Steriliser. 8. Dipping basin. 9. Outside washing plant. 10. Switchboard cabinet. A. Main hall. B. Sterile room. Z. From and to sterile lock.

Testing for defective ampoules by dipping the racks into water. Leaky ampoules float to the surface.

22°C., and a relative air humidity of 50-55%. The outside air, having passed through the conditioning plant and through appropriate sterile filters, enters the room through a "flighted ceiling" with many small openings, and leaves the room through lateral outlet ducts.

With this arrangement, it is possible to obtain the desired frequency of air changes without exposing the staff to draught. The room receives diffused daylight through permanently closed glass windows on the north side. Ultra-violet lamps, switched on outside working hours and occasionally during working hours, ensure the destruction of any germs which might have entered. Since the quantity of air passed into the room is about 10% greater than the outlet capacity of the lateral ducts, the room has a slight overpressure which prevents the penetration of any non-sterilised air. The side walls right up to the top, as well as the floors, are tiled, the joints being kept as small as possible so that all surfaces are smooth and easy to clean.

In addition to the overturning device already mentioned, the sterile room contains two automatic filling and sealing machines and an inserting machine.

In the wall separating the sterile room from the main hall next to the sterilising tunnel, three sterilisers are installed which have two doors so that they can be charged from the sterile room and emptied from the main hall. The three autoclaves are used alternately so that the production process is speeded up.

Filling the ampoules

The ampoules transferred by the overturning device to the VA boxes are fed into the input magazine of the ampoule filling and sealing machine. Passing through the machine in cells mounted on an endless chain, they are filled three at a time, and sealed by smelting while the pointed ends are drawn out. With drugs sensitive to oxygen, the solution is exposed to CO_2 or N_2 gas, also in three ampoules at a time, both before and after the filling, without thereby increasing the duration of the operation. In this way, the air remaining in the ampoules is reduced to a minimum. The solution itself, having been sterile-filtered, is taken to the sterile room through the lock C in well sealed vessels. The ampoules sealed by smelting are collected in the output magazine of the machine and are transferred, by means of a VA shovel, to the inserting machine where they are again automatically placed into the same receptacles from which they had been turned out. In this way, the original arrangement is again restored and if a further heat sterilisation should be necessary a uniform heat transfer is ensured. Having left the inserting machine, the receptacles containing the filled ampoules are placed on pallets which are fitted with castors and are placed on a trolley.

Sterilising filled ampoules

When 40 to 60 of these receptacles have been stacked on the trolley, they are steam sterilised (if this treatment is required for the drug concerned). The pallet truck is moved to the steriliser, and the pallet is pushed on rails into the steriliser. As soon as the door on the side of the sterile room is closed, the second door, on the side of the main hall, is also locked, and the sterilisation process can take place.

Temperature and duration of this process depend on the characteristics of the drug. First of all, the ampoules are pre-heated by steam to about 60°C. for a short time. This is followed by evacuation in order to remove all traces of air which would prevent an even heat transfer. Finally, the steam is admitted for the sterilisation process proper and automatically controlled to the correct sterilisation temperature. The end of the process is indicated by an acoustic signal and the temperature-time curve is automatically recorded. The process is immediately followed by the evacuation of the autoclave which has the following important objectives:

(1) Clouds of steam which would normally emerge on opening the steriliser are avoided.

(2) Sterilised goods are cooled down quickly so that the steriliser soon becomes available for the next charge.

(3) Weak, fracture-prone spots on individual ampoules will burst open and can thus be easily detected.

(4) Ampoules cracked by the heat sterilisation are, in this way, emptied wholly or at least partly.

The evacuation of the autoclaves is also carried out if the ampoules are not exposed to heat sterilisation and

the sterilisers thus merely serve as hatches connecting the sterile room with the main hall.

All the machines and implements in the sterile room are operated by no more than three female operators.

Washing and checking

After the autoclaves have been evacuated and aired, the door on the side of the main hall is unlocked and the pallet pulled out. The ampoules are not returned to the production line in the main hall. First, the racks carrying the sterilised ampoules are dipped in water. Ampoules which, because of leakage, are wholly or partly empty will at once be lifted from the rack so that they can be detected and eliminated at once. Still in the same arrangement in the receptacle, the ampoules then enter the outside washing plant. Placed on a chain belt in a duct covered with Plexiglass, the receptacles are moved along close to two sets of nozzles which spray hot water on the ampoules from all sides. Another set of nozzles provides an after-spray of desalted water.

To facilitate removing the cleaning water, the receptacles are then, for a moment, automatically tilted sideways; they then enter the drying tunnel in which they pass through a strong current of warm air. At the end of this tunnel the ampoules emerge clean, dry, at a temperature close to normal, and in undisturbed order.

Again, they are overturned as before, using the same cartons from which the empty ampoules had been taken at the beginning of the production line. It takes about 12 min. for a receptacle to pass through the 6 metre cleaning tunnel.

The autoclaves can be discharged and the outside washing plant operated by one woman operator.

Visual inspection

The filled cartons are taken on pallets to the room in which the visual inspection takes place. Here, from the inlet magazine of a special machine, the ampoules are brought by hand, preferable five at a time, into a position in which the pointed ends appear in a mirror exposed to suitable illumination so that they can be effectively and rapidly examined for charring or any leakages which may still remain undetected.

The inspection of the pointed ends is immediately followed by the examination of the content of the ampoule. This is done by taking the ampoules (preferably five at a time) from a chute, inspecting them against a black and white background, and returning them to the same box. This inspection permits the elimination of ampoules containing non-removable overlarge glass splinters or other foreign bodies which may have become detached from the glass wall during the sterilisation process due to glass erosion. After this visual inspection and after the physico-chemical and bacteriological tests, the ampoules are finally handed over to the finishing and packaging section.

The above article is an abridged translation of a paper in *Die Pharmazeutische Industrie*, 1960, **22**.

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Correspondence

Surfaces of Baths

To The Editor.

Sir: The consumer's complaint in your issue of October 1960 raises a problem which has been receiving our attention for over 15 years.

There is no doubt that the problem exists; there are distinct differences in the surfaces of baths as against glazed toilets and wash basins.

This is something that should be remedied and we have done our best to make it public—but it is difficult to make the public understand that vast numbers of baths are being made, as well as wash basins and other utensils, that will not stand up to ordinary soda in warm water for more than two years and in many cases less. To crown all this the makers of such articles make a powder to clean the baths, etc., and then point out that abrasives must not be used on the bath.

May we inform Mr. Hopewell that we also hope well and truly that if he can raise public support for better surfaces on baths and wash basins he will be doing a service to thousands of housewives who think that it is the cleaner that is doing the harm while in fact it is the surface of the bath or wash basin which is in fault.

Our cleaners have been banned by the bath manufacturers as reprisals for daring to mention the facts. It is not easy to fight vested interests unless public support is forthcoming.

C. J. Sutton,
Director,
Borite Ltd.

Westerham,
Kent.

No Shortage of Brucine

To The Editor.

Sir: We were surprised to read in "Topics and Comments" of your November issue, in the note "The Bitter End," that brucine is in short supply.

It is true that in the past there have been occasions when brucine has been in short supply, but there is no permanent shortage.

This company can make arrangements for the continuous supply of brucine wherever it may be required.

F. Chapman,
Managing Director,
Carnegies of Welwyn Limited.
Welwyn Garden City.

Laporte news. The house magazine of the Laporte group has been changed in design and presentation. The recent issues cover a wide range of topics, from chemicals for swimming baths to quarrying fullers' earth.

Glass containers. Jackson Bros. (of Knottingley) Ltd. are the latest firm to produce a house journal. The first issue of the new quarterly, *Look Ahead*, contains articles on various aspects of the firm's products and services.

150 years. The celebrations marking the 150th birthday of the Samuel Jones paper group are described in a recent issue of their house journal.

THE SCENT OF FLOWERS AND LEAVES *A Search for Fragrance among the Minor Natural Orders*

By Edward S. Maurer, F.L.S., M.R.I.

1. The Bindweed Family *(Convolvulaceæ)*

Mr. Maurer's book on Perfumes and their Production *(1958), is concerned only with the isolates and synthetic aromatics. In the preface he expressed his intention of writing a companion volume upon the natural products of interest to the perfumer. This is a task of considerable magnitude, but already he has published in "Soap, Perfumery and Cosmetics" some 45 monographs upon the floral fragrance to be found in the major natural orders. The essential oil texts deal with some 60 natural orders which embrace the essential oils and other products of commerce, but the modern botanical treatises list upwards of 325 orders, so that among the wild and cultivated, temperate and tropical plants, shrubs and trees, there must be many fragrant blossoms and aromatic folia (including malodours) which await location—a task which will occupy Mr. Maurer's leisure moments for many years. In the meantime, a preliminary survey of over 50 of the more important minor natural orders has been made, and as this is virtually a new terrain, it is thought that attention could be profitably directed to a brief encyclopædical presentation of those minor orders which appear to offer nuances of a* genre *not yet familiar to perfumers. This article is the first of the series.*

The osmical sentiments Mr. Maurer expresses upon natural fragrance are personal opinions, based in the first instance upon a consensus of impressions in the literature cited, private overseas correspondence, conversations with nursery gardeners, florists and flower enthusiasts, supplemented by visits to Kew and the Royal Horticultural Society gardens at Wisley, Surrey, and seasonal flower shows.

THE *Convolvulaceæ* (Bindweeds) is a medium-sized but osmically interesting family of twining or trailing herbaceous plants, climbing by means of their twisted stems. The flowers are funnel- or trumpet-shaped, pale pink, lilac, red or deep blue, and often striped with white.

The roots of most species abound in a non-toxic, milky, acrid juice, which in some instances hardens to faintly aromatic purgative resins, while the significant name of the Order is evinced in the Latin *convolvo*, meaning to entwine, in allusion to the interlacing proclivity of the plants.

There are some 40 genera and upwards of 1,000 species, mostly natives of S. America and India. About half a dozen species are found in Great Britain, the most familiar being *Convolvulus sepium*, the Great Bindweed, Bell-bind, Hedge-bell or Devil's-garter, and *C. arvensis*, the common Field Bindweed. Although the latter is one of the greatest pests to farmers and gardeners, it is a pretty sight with its sweet-scented blossoms, striped with white and rose, the scent of which is somewhat almondy, with leaves of a delicate green which trail for long distances along the meadows.

Although there are upwards of 120 ornamental species for the garden, some scented and others not, it is to some of the acclimatised tropical varieties to which attention is first directed. For instance, the indigo-coloured *C. Mauritanicus*, so named from its beautiful deep blue shade, is a native of Argentina and considered the handsomest of the genus. The Brazilians call it *Campana azurea* (azure-bell) and *Fiore di notte* (night-flower), for, like many of its companions, its scent and beauty appear mostly at night, but this is not always the case.

Of *C. major*, there are several magnificent pale blue, white, deep red and purple-flowered varieties; while *C. minor* is a native of Spain, a bright blue fading by delicate gradations to a pure white in the centre, so that it resembles that blue atmosphere relieved by light clouds on some fine days in summer, when, as Keats remarks:

> "On high,
> Through clouds of fleecy white, laughs the cerulean sky."

Some species of the Convolvulus are peculiarly sensitive, inasmuch as many of the blossoms close at night; while some remain enfolded all day when the weather is wet or cloudy, other species remaining open wide to the sunshine all day long:

> "Like flow'rs, which shrinking from the chilly night,
> Droop and shut up; but with morning's touch,
> Rise on their stems, all open and upright."
> Dante, *Inferno*, Canto II.

This delightful sentiment finds echo in the sobriquet bestowed upon the allied genus, the *Ipomæa*, the familiar "Morning Glory."

The convolvulus fragrance

I find in the "fragrant garden" books and sundry Tropical Floras a general concurrence of opinion that the scented proclivity, where it is evident, "reminds one of almonds," but some writers are a little more precise and remark "almond blossom." I would describe those specimens which I have examined—wild, garden and hot-house blossoms—as partaking of a triad frequently encountered in these investigations, namely an almond-hawthorn-vanilla complex. In passing,

however, we may note another fragrance-pattern, for *C. scoparius* and *C. floridus*, indigenous to the Canary Islands, yield the occasionally-encountered Oil of Rhodium; this has a mild rosaceous guaiac- and sandal-wood nuance.

Ipomœas

These are closely allied to the Bell-flowers. There are some 80 varieties of the cultivated plants as well as many tropical species. The signification of the Greek words *ips/homios* is bindweed-like, or having a twisting tendency. Many species indigenous to India, and collectively known as "Traveller's Midnight Lilies," are similar to *I. muricata*, which is described as "a plant with thick succulent stems, of very luxuriant growth, and widespreading habit; bearing large, handsome pale-purple Convolvulus-like flowers, which only open after dark, exhale their scent and fade away shortly after dawn next morning."

Morning Glory

Many of the upwards of 80 species are sweetly-scented, others showing no such inclination. For a prototype *I. bona-nox* may be selected. This is the Aniseia, Bengal or Moon Creeper, also known as the Mexican Morning Glory. This may be allied with *I. grandiflora*, the Burmese Moonflower. Both have pure white blossoms and exhale a fragrance which is perceptible at considerable distances—the fragrance I should describe as a very sweet heliotrope-hawthorn scent.

Sundry Ipomœas

I would record for investigation at some time the following species, for by their common names they evidently have much to disclose:

- *I. Caroliniana* The Cypress-vine of Carolina,
- *I. fastigiata* B.W. Indian wild potato,
- *I. leptophylla* Man-root of Colorado,
- *I. pandurata* N. American Indian wild potato-vine,
- *I. quamoclit* B.W. Indies, wild sweet-william,
- *I. bonariensis* Jamaica sweet-potato,
- *I. cærulea* S. African blue-flowered bindweed.

Allied genera

Calystegia: There are about a dozen pink - flowered cultivated species of this genus, of which *C. sepium* is the large hooded pink bindweed; this and the Argentinian *C. rosada* are remarked as being slightly spicy.

Pharbitis: These are the Gay-bines of N. and S. America, the Greek name signifying richly-tinted blossoms; of the 20 or so species the only potentially interesting item is the blue-flowered Mexican *P. cathartica* because of its aromatic resinous roots.

Rivea (after A. de la Rive, a famous French botanist): The E. Indian *R. tiliæfolia* and *R. bona-nox*, the Midnapore Creeper, are white-flowering species which are reported to have an almond scent. This is also observed among the *Argyreias*, of which *A. bona-nox* is the E. Indies Silver-weed and also the N. American *Bonamias*.

Evovulus: In Greek this word signifies non-twining. There are about a score of these Central American white-flowered species, with which may be included the W. Indian *Dinetus* (Gr. to twine) and the S. American *Nolanas* (Sp. little bell), but the sources consulted do not indicate any scent.

Quamo/clit: The Greek *kyamos/klitos* signifies *kidney bean/dwarf* from the resemblance to this species. There are about a dozen wild and cultivated varieties, of which *Q. vulgaris* is the common Scarlet American Bell-flower. The crimson *Q. angulata* of Argentina is appropriately named the *Flor de Cardenal*, while sundry other species have such local names as Cupid's-flower, Cypress-vine, Indian Forget-me-not—all of which are remarked as having a "somewhat almond-like scent."

Calo/nyction: Literally the Greek *kalos/nyx*, means beautiful night-flowering—this is another of the E. Indian nocturnal blossoming purple lilies, while the white flowers of *C. grandiflora* take their place in the assembly of the many *Moonflowers*. Both are reported to have a spicy clove-like scent.

Mina (after F. X. Mina, a renowned Belgian botanist): Some of the Mexican Ipomœas are recorded under this genus, for instance *M. lobata* is described as producing a mass of lovely tube-like red-and-yellow blossoms, produced in double racemes, graduating in colour from the vivid scarlet in the terminal buds to orange and yellow, while the fully-developed flower is a delicate cream colour. The fragrance, be it noted, is of a type not accounted for as yet in this N.O., namely a lavender-like nuance, which incidentally it shares with the E. Indian Silver-creepers. Something similar is noted for the genus *Porana*; the name is from the Greek verb *poreno*, meaning to travel, for the twining stems extend far and wide.

The medicinal bindweeds

We may note from various species of *Ipomœa*, *Exogonium* and *Convolvulus purga* that these are the commercial sources of the true, swift-acting, drastic purgative jalap resins. In my opinion these plants may at some time prompt an investigation into the probable fixative potentials of these root resins, for we may note the laconic remark in Potter's "Cyclopædia" regarding jalap root: "Odour smoky, due to the smoke over which the root has been dried. Good jalap should contain 10% resin."

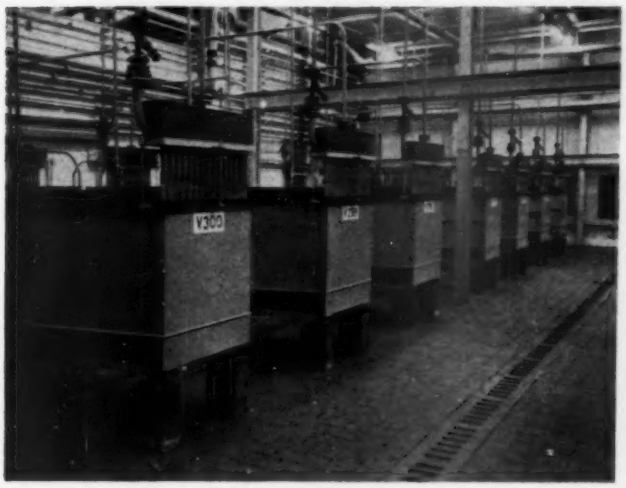
Furthermore, if we refer to Scammony Root, Mexican (*Ipomœa orizabensis*, we may note that Virgin Scammony is a gum-resin obtained by cutting and draining the living roots of *Convolvulus scammonia*. The milky sap is allowed to dry in shells and is generally imported from Smyrna in cakes 1 or 2 in. in diameter. This product contains from 70 to 80% of scammony resin, the remainder is mostly gum.

Merck's Index informs us of the incidence in this resin of dihydro cinnamic acid and β-methyl esculentin, while we may also note that among the several species of the fragrant Mirabilis of Peru there are some varieties which yield the false jalap, which again suggests that among some of these resins, and particularly in the oils derived from them, are potential fixatives of considerable interest.

Cuscuta: The *Cuscutas* or *Dodders* are parasites, a destructive genus found in every Continent. The significant name is derived from the Arabic *kechout*, meaning a strangling embrace. Its habit may be observed from the Frisian name of *Dodder*, meaning a bunch, and referring in particular to the bunches of red threads which entangle those plants, its sinister selective capacity towards its host leading it to infect and eventually destroy whole crops of flax and clover.

There are some 15 wild species peculiar to N. America, and, oddly enough, about the same number of cultivated varieties for ornamental

(*Continued on page* 33)



Left: A battery of electrolytic cells at Laporte's new sodium chlorite plant. Right: A reaction cascade, where chlorate solution is mixed with hydrochloric acid.

Britain's First Sodium Chlorite Plant

PRODUCTION of sodium chlorite has now started at the Luton plant of Laporte Chemicals Limited.

This is the first chlorite plant to go into production in Great Britain. Hitherto sodium chlorite has been imported from Europe.

The Kesting process licensed by Elektrochemische Werke Munchen, Munich, is employed by Laporte. In this process a solution of sodium chloride and chlorate is circulated through a battery of electrolytic cells. A portion of the electrolyte is continuously withdrawn and reacted with acid to release chlorine dioxide and chlorine. The chlorine dioxide is purified and combined with caustic soda and hydrogen peroxide to give a solution of sodium chlorite.

Sodium chlorite will be marketed as a crystalline powder obtained from the above solution with the normal industrial strength of 80%. It is used for textile bleaching, particularly of cotton, linen and synthetic fibres such as nylon, and for bleaching paper pulp, flour, oils, fats, waxes, shellac and straw. It is also useful for the purification of water supplies, where it overcomes the residual odours which sometimes arise after chemical treatment.

The plant is largely constructed of plastic, glass, ceramic, stainless steel and titanium metal. It is housed in the building which was previously used for the production of hydrogen peroxide by the electrolytic method. The Luton plant was closed down following the opening in September 1958 of the new Laporte hydrogen peroxide plant at Warrington, which is based on the autoxidation process.

The manufacturing process used at Luton may be divided into four main parts:

1. The chlorate cycle.
2. The chlorine dioxide generating plant.
3. Chlorite production.
4. The hypochlorite plant.

The chlorate cycle

A solution of sodium chlorate and sodium chloride flows by gravity from the main storage to electrolytic cells. In passing through the cells some of the chloride is converted into chlorate with the evolution of hydrogen which is removed from the system. The solution enriched with chlorate flows again by gravity from the cells to a sump for treatment before return to the main storage.

The cells are coupled up in series and provided with direct current of approximately 6,000 amps. at full production by a rectifier supplied by a transformer from the mains.

This rectifier is of the germanium type giving high efficiency at the voltages required.

The chlorine dioxide generating system

A small proportion of the solution which circulates through the chlorate cycle is taken as feed to the reaction cascade. This solution is mixed with hydrochloric acid in the first of six vessels in the cascade. These are so arranged that the reacting solutions overflow from one vessel to the bottom of the next by gravity, whilst a counter-current stream of air removes the chlorine and chlorine dioxide formed by the reaction.

This chlorine and chlorine dioxide in the air from the reaction cascade are separated in a system consisting of two vessels, one absorbing and one stripping. In the first vessel chlorine dioxide is absorbed allowing a chlorine/air mixture to go forward to the hypochlorite plant. The chlorine dioxide solution from the absorber passes to the stripping vessel, where chlorine dioxide is removed with air.

Chlorite production

The air/chlorine dioxide mixture from the stripper passes into a reaction vessel where it combines with sodium hydroxide and hydrogen peroxide to form an aqueous solution of sodium chlorite which is passed to storage vessels. From here it is pumped to a spray drier to give the dried anhydrous product.

Sodium hypochlorite plant

The chlorine/air mixture separated above is passed to a reaction vessel in which the chlorine is absorbed in dilute sodium hydroxide solution to produce sodium hypochlorite of 14/15% concentration.

A large swarm of desert locusts flying at a height of under 50 ft.

Testing Solvents for Anti-Locust Insecticides

By A. D. Harford*

Attempts to improve the quality of hydrocarbon solvents used as carriers for anti-locust chemicals are being made at the BP Research Centre in Middlesex. Tests involve biological assessment and this requires the breeding of locusts. The test procedures are described in this article.

A GROWING world population calls for a great increase in food production and this can only be achieved if adequate protection is provided against destruction by pests during the production and storage of all types of food.

As an agricultural pest the locust has a longer history and a worse reputation than any other insect. The annual value of locust damage based on the years 1925-34 was estimated to be £8·3 million sterling.

If the cost of controlling such a pest is less than the damage it prevents, then it is undoubtedly well worth while. At the present time if the cost falls only fractionally below the cost of the potential damage, then the operation is more than worth while in the terms of food saved.

Effective control at present depends upon chemicals, and in recent years considerable effort has been expended in the study of the biology of the locust in relation to both the strategy and tactics of chemical attack. As a result dusting and baiting as a method of dealing with hopper bands (swarms of young locusts) have been almost entirely abandoned in favour of aerial spraying.

The insecticides most widely used for this purpose are dinitro-ortho-cresol (DNOC), gamma benzene hexachloride (BHC), aldrin, dieldrin, malathion and diazinon. With the exception of the last two compounds all the substances are solids and are most effectively applied in oil solutions.

The techniques of aerial spraying, both air to ground and air to air, have been studied at the Chemical Defence Experimental Establishment at Porton, with the result that aerial spraying can be adopted for application of insecticides against egg fields, hopper bands, settled and flying locusts, thus providing an effective means of control covering the complete life cycle of the insect.

* British Petroleum Co. Ltd., BP Research Centre.

Requirements of solvent

In this development the hydrocarbon solvents used as carriers for the insecticidal chemicals inevitably play an important part and any solvent for the job must possess two obvious qualities—low cost, and the ability to dissolve a large quantity of the pesticide.

Less obvious requirements are:

(*a*) A boiling range of 200°-350°C. to ensure stable droplet size of the atomised spray in the climatic conditions existing in locust infested areas.

(*b*) A viscosity of not more than 12 centistokes at 80°F. to ensure a free flow of liquid in the spray nozzles.

(*c*) A closed flash point of not less than 200°F. for safety in storage, transit and use.

The types of solvents that meet these requirements are aromatic extracts from the petroleum industry. Up to the present, a high boiling aromatic solvent obtained from solvent extraction of kerosine (KEB)

has been employed as a solvent for locust sprays, but with the advent of new refinery processes there is a new range of products of the KEB type. These are all products with a high aromatic content and the ability to dissolve large quantities of insecticidal compounds.

At the BP Research Centre a programme of investigation into the properties of these refinery products has been initiated with the specific aim of improving the quality of the solvent oil available for locust control.

Experiments with other insects have shown that there is a considerable variation in the speed of action of contact insecticides with different solvents and the present work is aimed at producing a solvent which, besides having the required physical and solvent properties, has in addition the ability to decrease the time required for the poison to penetrate the insect cuticle and reach the site of action.

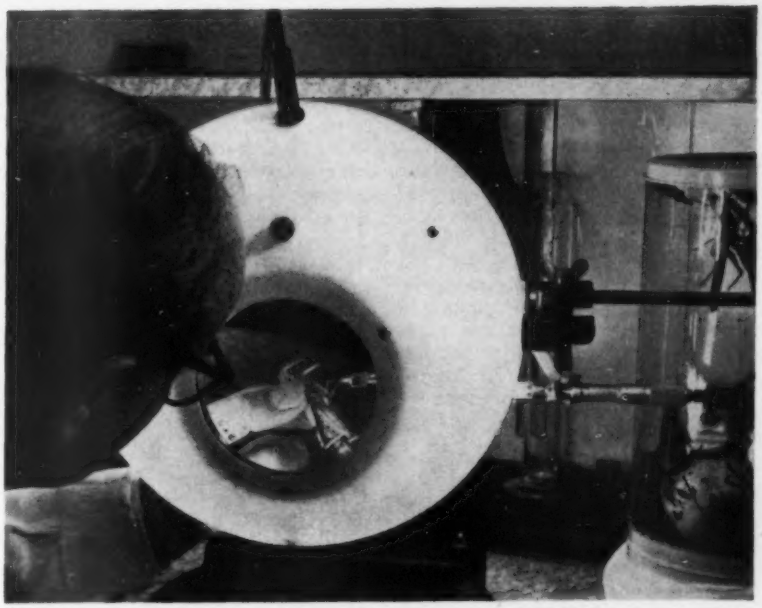


Fig. 2. Dosing a locust with insecticide. A measured volume is applied by means of a microdrop syringe to the intersegmental region between the first and second abdominal sternites of the insect.

Rearing test insects

The work necessitates the breeding of locusts in captivity for biological assessment of the time of action, and for this purpose the African migratory locust (*Locusta migratoria migratorioides R and F*) has been chosen because it is the easiest species to rear under laboratory conditions.

The cages employed for the breeding and rearing are of the type shown in Fig. 1, being essentially a wooden box fitted with a removable false floor of perforated zinc with wire mesh panels covered with Perspex ventilator controls. The adjustment of the ventilators enables the correct conditions of temperature and humidity to be maintained. A night temperature of 82°F. and a day temperature of 93°F. are desirable with a relative humidity of 50 to 60% at night and 30-50% during the day. The temperature of the breeding room is maintained at 82°F. and the day temperature of 93°F. is maintained by switching on a 60 watt bulb in the roof of the cage for the duration of the working day. A pad of cotton-wool moistened with water and placed in the corner of the cage maintains the required humidity which can be checked from time to time by the introduction of an Edney paper hygrometer.

Fig. 1. A locust breeding cage. Adjustable ventilators ensure maintenance of correct temperature and humidity.

The glass door in the front can be opened for ease of cleaning, while a small roof door can be used for daily removal of debris, the feeding of the insects and their removal for test purposes.

Dry branched twigs standing upright in the cage allow hoppers to moult and sit near the light bulb for warmth. The twigs also help to utilise the space available in the cage and prevent the insects crowding the floor. Cleanliness is essential for healthy culture and uneaten grass, fæces and moist cotton-wool pads are removed daily. In addition at intervals of four to five weeks the occupants of a cage are removed to a clean cage and the used cage thoroughly cleaned and sterilised.

Life cycle

Newly hatched locusts or hoppers are about the size of a housefly, and after moulting five times reach the adult stage usually in four to five weeks under the laboratory conditions. A cage of the type used at the BP Research Centre can accommodate approximately 1,000 hoppers initially and usually yields about 200-300 adults when the fifth and final moult is completed.

At this stage, when the cuticle of the fledglings has hardened the insects have dark grey markings on a pink grey background which changes gradually in the course of four weeks through a cream colour to the bright yellow of the fully mature male or the dark brown of the mature female. Mating then commences and the females begin egg laying. The eggs are laid in moist sand in batches or pods containing a variable number of eggs, usually from 40 to 100. It is now that the locusts are transferred to a breeding cage with a central hole in the false floor capable of receiving a flower pot of about 4 in. diameter

and 4 in. high. This is packed with moist sand and rests on the main floor so that the top is flush with the false floor.

These pots are changed every two or three days and replaced by fresh pots. The dry sand is tipped off the top of the the pot to expose the tops of the egg pods present. Pots containing eggs are covered with a petri dish and incubated at 86°F. in an incubator in which a moist atmosphere is maintained by placing a small dish of water on the floor. After twelve days the first hoppers begin to emerge and the pot is transferred to a rearing cage and the cover removed. When all the hoppers have emerged the pot is removed and the cycle of events described is repeated.

Biological testing procedure

This is similar to that described by Mac Cuaig.[1] Suitable concentrations of insecticide are prepared in the oil under test so that equal volumes of solution are required to produce a number of preselected amounts of active ingredient per gram of locust body weight. In other words, in this procedure the volume of insecticide solution per gram of locust body weight is always constant whatever the dosage level of the active ingredient.

The individual locusts are weighed with a spring torsion balance and the volume of solution required to produce the given dosage of active ingredient in terms of micrograms per gram weight of locust is calculated. This volume is then applied by means of a micro drop syringe to the intersegmental region between the first and second abdominal sternites of the locust (Fig. 2). Groups of 20 locusts (ten male, ten female) are treated by this method at each dosage level employed in the test. After treatment each group of insects is kept in a cylindrical cage (of the type shown in Fig. 2) in the laboratory at 80°F. and 60% relative humidity. A group of control insects is set aside at the same time and kept under identical conditions in order to determine the natural mortality.

Mortality counts are made at 8-hr. intervals and continue until no more deaths occur. (An insect is considered dead when after being turned upside down it cannot right itself.) The percentage mortalities at the various dosage levels are plotted on logarithmic probability paper and evaluated by the procedure of Litchfield and Wilcoxan[2] for each count. A series of median lethal dosage values are therefore obtained, each taken at a stated time interval after dosage. When the insecticide has completed its action there will be no further decrease in the value of the median lethal dosage and a plot of the dosages against time gives a curve showing the speed of action of the insecticide in the test solvent.

Present position

A number of tests were conducted with this procedure using the insecticides DNOC, BHC and dieldrin in KEB solution. The results of the tests are recorded in Table 1 and fall within the spread of published values. To date the inspection data and solvent properties of a dozen possible solvents have been examined. All of them have better solvent properties than KEB, but five had to be rejected on account of low flash points and low boiling ranges. Biological assessment of the remaining seven products is in progress, and although one solvent has given results in one series of tests that indicate that it is capable of reducing the time for maximum mortality by one third, it would be premature to go into detail until further tests have been undertaken to confirm the results of the initial experiments.

The author thanks the Chairman and Directors of the British Petroleum Co. Ltd. for permission to publish this article.

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Table 1. Toxicities of DNOC, BHC and Dieldrin to Locusta Migratoria

Insecticide	LD_{50} $\mu g/g$	LD_{99} $\mu g/g$	*Duration of test (hours)*
DNOC	13·5	32·0	24
BHC	6·6	17·4	216
Dieldrin	2·4	98·0	168

Industry's Publications

Films on materials handling. The National Joint Committee on Materials Handling, a co-ordinating committee of professional and other non-trading research and development associations interested in materials handling, published in May 1958 a list of films on materials handling, giving size, running time, a brief synopsis, and the source from which each may be obtained. The list has now been revised and considerably augmented to include particulars of approximately 100 films. Copies, price 2s. post free, may be obtained from the Secretary, National Joint Committee on Materials Handling, 32 Watling Street, London, E.C.4.

Pharmaceuticals. A new pharmaceutical products catalogue has been published by Abbotts. The chemical constitution of each product is given with a description of its action, uses, administration, dosage and supply. The catalogue has been produced in a convenient form for dissection and addition of new product pages.

Fire hazards. Two new technical reports have been published by the Electrical Research Association entitled " Spontaneous ignition temperatures of inflammable gases and vapours " and " Intrinsically safe electrical apparatus: relation of igniting current to inductance for a mixture of air with ethylene." The former deals with the measurement of ignition temperatures, and the application of this information to the use of electrical equipment in hazardous atmospheres. The latter report is concerned with mixtures of air and ethylene that are readily ignited by a spark from an inductive circuit and the relationship between minimum igniting current and inductance.

Laboratory equipment. A new catalogue has been issued by the Loughborough Glass Co. There are three sections: interchangeable laboratory glassware, plastics laboratory equipment and general laboratory equipment.

Lepetit. This well-known Italian firm was started in 1868 as a branch of Ledoga S.A., the first and largest manufacturer of tanning products in Europe. Lepetit soon became firmly established in the pharmaceutical world and are now in the forefront of European manufacturers, with valuable original discoveries to their credit. A lavishly illustrated booklet describing their activities has been issued and copies are available from Lake and Cruickshank Ltd.

FLAVOURING AND COLOURING MEDICINES

By G. R. A. Short,* F.P.S., F.L.S.

Among the many problems of presentation posed by the increasing number and complexity of new drugs, not the least are those concerning flavour and colour. Pharmaceutical manufacturers are now inclined to consider it a duty to make their medicines palatable and elegant. The author discusses the general principles of flavouring liquids, powders and tablets and gives the fruits of his own long experience as a flavour chemist.

WHEN deciding upon a flavour for a medicine there are a number of factors to be considered. Is it desired to just mask the unpleasant ingredients or to impart an overriding taste and odour? Is the medicine to be taken continuously over a long period, or will a few doses only be necessary? The flavour must be compatible chemically and it must be miscible with the vehicle; for example, an acid flavour such as a natural fruit syrup cannot be used with alkaline medicaments, and if a clear product is required in an aqueous medium, then a soluble flavour must be employed.

In a paper read at the Harrogate Pharmaceutical Conference in 1951, Eastland[1] enumerated four methods of approach to the flavouring or masking of distasteful drugs: (1) To use a pleasantly flavoured substance which has something in common with the drug; such as orange with gentian or quinine. (2) To use substances such as menthol or oil of peppermint to produce a mild local anæsthesia. (3) To use colloidal solutions such as mucilage of acacia as a vehicle. The mechanism here is unknown, but it is an effective method in some cases. (4) To use moderate concentrations of sodium chloride in which the bitterness of some drugs is lessened. He states further that oil-soluble drugs can be dealt with by producing emulsions of the oil-in-water type, but the effect of emulsification is much less useful for water-soluble substances which will remain in the disperse phase.

The effect of effervescence, *i.e.* the production of carbon dioxide when the powdered or granular medicine is added to water, is well known as an effective method of taking certain unpalatable medicaments such as salines. Such products may be sweetened or unsweetened and may often be improved by the addition of flavours, particularly of the citrus type. Hadgraft[2] has taken advantage of this property of effervescence in the formulation of a tablet to correct potassium deficiency. This tablet contains potassium bicarbonate, potassium acid tartrate, citric acid, sugar and saccharin, but no flavour is used.

* Chief Flavour Chemist, W. J. Bush and Co. Ltd. This article is an abridged version of a paper given before the Pharmaceutical Society of Great Britain on December 7.

"Taking Physick"—from a caricature by James Gillray.

Panel testing

Flavouring pharmaceuticals is perhaps one of the most difficult problems confronting the flavour chemist, since members of his tasting panel are sometimes averse to testing drugs and moreover the taste buds are often readily immunised by the undesirable character of the medicine. In view of the fact that different people respond differently to the same taste stimuli, and that individual tasters are influenced by factors such as the time of day, environment, temperature, age, stress and strain and physical health, it is wise to employ an expert panel.

In an effort to determine flavour preferences and the comparative efficiency of some commonly used syrups, Wright[3] in the United States tested 13 syrups on a group of University students. He found that syrups of cacao and raspberry were the most popular, second choices being syrups of orange, cherry, sarsaparilla and citric acid. When 0·1% of quinine bisulphate was added syrups of raspberry, eriodictyon and cacao were found most satisfactory in disguising the bitter taste. When 8% of ammonium chloride or 17·5% of sodium bromide was added, syrups of cinnamon, orange and sarsaparilla were the most effective in disguising the saline taste. Syrups of raspberry and cacao were best for disguising the taste of tincture of digitalis. With a similar end in view Purdum[4,5] used a different method based upon the threshold of taste for the drug in aqueous solution. Having determined the amount of drug required to make a solution which could just be tasted, a similar quantity was dissolved in the vehicle under test. By this method the bitter taste of quinine was disguised most effectively by syrup of cacao N.F.VI, syrup of liquorice and syrup of cacao N.F.V, in that order. For ammonium chloride the best vehicles were syrups of liquorice, raspberry and citric acid.

Wesley[6] in 1957 published an interesting list of the flavours contained in 200 popular pharmaceuticals which were on sale in the United States. This list showed that

cherry, chocolate, mint, orange and raspberry could be considered adequate to provide flavour for 93% of the preparations.

Summarising four American papers[7,8,9,10] on the general subject of flavourings for pharmaceuticals brings forward the suggestions for various types of medicine given in the accompanying table.

Flavours for 22 Groups of Medicines

Analgesics and Antipyretics—Grenadine
Antibiotics—Banana, Butterscotch, Chocolate, Citrus, Maple, Mint-Spice, Orange, Peach, Peach-Anise, Pineapple, Vanilla, Wild Cherry
Antihistamines—Anise-Birch, Anise-Mint, Black-currant, Cherry, Chocolate, Citrus, Coconut, Coconut-Vanilla, Raspberry, Rum-Peach, Spice-Vanilla, Wild Cherry
Barbiturates—Anise-Citrus, Black-currant, Cherry, Lime, Mint, Conc. Orange Juice, Raspberry, Spearmint, Spice, Strawberry, Vanilla, Wine-Raspberry
Bitters—Liqueur Flavours, Port, Raspberry, Salt-Sugar, Salt-Sugar-Anise, Vanilla
Bromides—Apricot, Peach, Peach-Anise
Cough Syrups—Apricot, Blackberry, Black-currant, Butterscotch, Gooseberry, Loganberry, Peach, Peach-Anise, Peach-Orange, Peach-Rum, Pineapple
Digestive Preparations—Chocolate, Maple, Maple-Butterscotch, Mint-Anise, Orange, Peppermint, Raspberry, Vanilla, Wild Cherry
Emulsion—Black-currant, Butterscotch
Expectorants—Black-currant
Geriatric Preparations—Banana, Coffee, Pineapple, Port, Vanilla
Iron Preparations—Aspic, Aspic-Sodium Glutamate, Black-currant, Loganberry, Strawberry
Laxatives—Aspic, Aspic-Sodium Glutamate, Butterscotch, Butterscotch-Maple, Pineapple, Pineapple-Orange, Strawberry
Liver Preparations—Black-currant, Sodium Glutamate
Pediatric Preparations—Banana, Butterscotch, Chocolate, Coconut, Coconut-Vanilla, Grenadine, Pineapple, Vanilla
Phosphates—Port, Raspberry, Vanilla
Piperazine—Strawberry
Protein Hydrolysates—Aspic, Aspic-Sodium Glutamate
Sulpha Drugs—Pineapple, Strawberry
Vitamins—Aspic, Aspic-Sodium Glutamate, Banana, Butterscotch, Butterscotch-Maple, Caramel, Cream Soda, Maple, Maple-Honey, Maple-Vanilla, Pineapple, Strawberry, Vanilla
Yeast—Black-currant, Strawberry
Wide Applications—Lemon-Lime, Lime, Passion Fruit

Flavour for children

Almost exactly ten years ago a series of three articles under the title "Medicine for Children" appeared in the *Chemist and Druggist*. In the first article Hadgraft[11] pointed out that palatability is an important factor because if treatment is difficult to administer there is danger of its discontinuance. It has, however, been stated that pleasantly flavoured medicines for children should be discouraged on the grounds that they are likely to promote a medicine-taking habit and that there is a risk of overdosage. The responsibility here surely rests with the parent to ensure storage out of reach, in any case sugar-coated tablets have been available for many years. Cacao and raspberry syrups of the U.S.P. are mentioned as being suitable vehicles for sulphonamides, while raspberry syrup is a useful addition to acidified mixtures of potassium citrate. Hadgraft refers to the fact that the inclusion of synthetic flavours in official formularies is hampered by the difficulty of providing formulæ and specifications for them.

Miss Islip[12] follows with an article sub-titled "Flavouring May Not be the Answer." She says that the difficulty of persuading young children to take medicine often lies in the way it is given. Unpalatable preparations should never be mixed with food; children usually enjoy taking medicines through a straw. In Miss Islip's opinion sweetness and colour are important, but distinctive flavours can become objectionable when taken over long periods. Certain flavours lend themselves to certain drugs, for example orange with citrates, dill with carminatives, ginger with cascara and rhubarb, camphor and aniseed with cough mixtures.

In the third instalment[13] of the series I point out that the argument that it is inadvisable to render potent mixtures too attractive is often nullified, since the active ingredients usually affect adversely the added flavour. The compilers of an official formulary or of a hospital pharmacopœia are somewhat limited in their choice of flavouring ingredients. They must confine themselves to a few well-known aromatic substances such as vegetable extracts, essential oils and fruit syrups. Manufacturers of pharmaceutical specialities, which of course includes many pharmacists in hospital departments and in retail practice, are not hampered by any such limitations. They can either experiment with the many compounded flavours available or better still submit their problems to an essence manufacturer.

To determine children's preferences for flavoured medicine must of necessity be difficult, as one can hardly expect to be able to organise a tasting panel composed of juniors. It is, therefore, necessary to rely upon a system of trial and error combined with a certain amount of coaxing. It would appear that the best method of attacking this problem is to secure the services of a group of children and to give them flavoured syrups, without medicaments, to taste. Such an experiment was conducted a few years ago with some success by Mr. J. O. Davidson of Tunbridge Wells, with the co-operation of a local nursing college. A set of ten syrups was tested on 33 children.

A blend of peppermint, chloroform, saccharin and syrup was found to be acceptable to every member of the group; the second choice, which was well received by 31 of the children, was a mixture of cardamon, bitter orange, cinnamon, clove, anethol and caraway in syrup. About two-thirds accepted a combination of vanillin, bitter orange, cardamon and cinnamon in syrup. Only 13 favoured syrup of cocoa and 10, syrup of raspberry. The syrup which was almost universally disliked, receiving only 5 votes, was flavoured with anethol, fennel and benzaldehyde.

Practical examples of successful flavours

Most of the published work on the flavouring of pharmaceuticals has appeared in American literature, but since our tastes differ somewhat from those of our friends in the States, it may be useful to quote some examples from my own experience.

Cod-liver oil emulsion was formerly flavoured with almond, but useful variants of this are hazelnut, walnut, creamy caramel and butterscotch. Similarly, malt extract with cod-liver oil by virtue of its viscosity, colour and basic flavour suggests the use of caramel and toffee flavours, vanilla and butterscotch.

Blends of citrus oils with or without vanilla or almond are also useful. Cod-liver oil itself is difficult, but citrus oils such as orange or tangerine give reasonable results. Petroleum emulsions having a bland character are improved by the addition of creamy flavours such as vanilla, marshmallow or cream soda, coupled with syrup or saccharin. Liver extract is a troublesome product and for this savoury flavours such as celery, sage and monosodium glutamate are perhaps the best, but citrus and caramel flavours have been found useful. For alkaline digestive mixtures cream flavour, vanilla, aniseed, fennel and of course peppermint are satisfactory. Owing to the powerful adsorption of flavours on to the ingredients indigestion powders are best aromatised with powder flavours. These powder flavours must be of the "sealed in type" which liberate their flavour only on moistening with water.

Linctuses having an acid reaction lend themselves to flavouring with fruit syrups such as cherry, raspberry, strawberry or black-currant. For best results fruit juice syrups should be used, these may be prepared from fresh juices, in season, or from diluted concentrates. As pointed out by Etchells[14] these concentrates tend to darken in colour on storage although the flavour is retained; it becomes necessary, therefore, to add colour to the syrups produced from them. Should the cost of these syrups be considered prohibitive, then one must use essences together with the appropriate colour in a base of acidulated syrup. Linctuses having a neutral reaction can be flavoured with essential oils such as aniseed, fennel or cloves either singly or blended; for less stereotyped flavours passion fruit, black-currant, apricot and wine types can be employed.

Guaiacol and creosote are particularly difficult to mask, so for these powerful flavours such as peach or apricot are indicated. Guaiaphenesin blends quite well with syrups flavoured with strawberry, blackberry, cherry, raspberry and caramel. A mixture containing senna extract was improved with a fig essence.

Iron preparations remind one of Sam Weller's visit with Mr. Pickwick to Bath. When asked by Mr. Smauker whether he disliked the "killibeate" taste of the waters, "I don't know much about that 'ere," said Sam, "I thought they'd a very strong flavour o' warm flat-irons." A very true statement when applied to inorganic iron preparations, but we have used cherry, raspberry and pineapple with fair success, while orange syrup is included in the N.F. for Mist. Ferri Sulph. pro Infant. Organically combined iron is simpler to mask; as an example Mist. Ferri et Ammon. Cit. pro Infant. N.F. is flavoured with Aromatic Spirit of Orange.

Sulpha drugs are difficult, but saccharin together with a fruit flavour such as strawberry, raspberry, apricot or passion fruit is reasonably effective. Antibiotics in liquid form can be flavoured with fruit flavours, particularly lemon, lime, orange and perhaps ginger, but for tablets and lozenges it is best to use powder flavours. An interesting point with regard to tablets which emit an objectionable odour when bottled is that this can be partially masked by treating the cotton-wool plug with a solution of vanillin and drying before insertion.

Invalid foods having a milk powder base can be improved by the use of caramel, butterscotch, vanilla, peach, apricot or black-currant powder flavours. For protein hydrolysates pineapple, banana, caramel, honey, butterscotch and savoury flavours are to be recommended. For amino-acids spice flavours such as ginger or cinnamon are best. Powdered yeast preparations blend well with savoury flavours and in some cases plum and vanilla can be used. Mixtures containing the vitamin B complex can be improved with nut flavours such as hazelnut or walnut. Vitamin B_{12} is a rather special case for which flavours free from aldehydes are required.

The only satisfactory flavour in my experience for paraldehyde draught is peppermint. Preparations containing chlorides and other saline drugs can be improved with cream soda, maple or chocolate flavour. For barium meals butter and caramel flavours have been found to be useful.

I feel it only fair to record here my worst failure in this field, that is, with male fern extract, which we have so far found absolutely impossible to cover.

Colours

I do not propose to discuss colours in detail but would stress the importance of colour in children's medicines. Although in articles of food and drink it is necessary to match the colour of the flavour, this is not essential in pharmaceuticals. It may be considered necessary for reasons of identification to use different colours in conjunction with similar flavours. The Colouring Matter in Food Regulations 1957 lists 30 permitted coal tar colours for use in food. Although the use of these is not compulsory in medicines they have the advantage of being available in pure form and of standard tinctorial power. The regulations also provide a permitted list of colours other than coal tar; of these the most useful are caramel, alkanet and annatto, the latter two being of value when an oil soluble red and yellow are required.

In a series of experiments carried out in the Codex Laboratory it was found that in solutions containing amaranth the colour tended to fade when the *p*H was greater than 5 and carmoisine at a *p*H greater than 6. Similarly tartrazine tended to fade at *p*H 4. Sulphan blue showed fading in the presence of reducing sugars. When adding red FB to Mist. Pot. Cit. pro Infant. the colour was precipitated.

* * *

In conclusion I stress the importance, when formulating a new product, of conducting a storage test at room temperature and at an elevated temperature. This will demonstrate whether the flavour has changed and whether colour fading has taken place. Don't over-flavour, over-colour or over-sweeten. If it is decided to hand over a flavour problem to experts, give an indication of the constituents of the medicine if possible, and above all, state the proposed dose.

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Analytical Chemistry

By C. A. Johnson, B.Sc., B.Pharm., F.P.S., F.R.I.C.

Pesticides • Fine Chemicals • Drugs and pharmaceuticals
Steroids • Antibiotics • Vitamins • Fixed oils

THE impact gas-liquid chromatography has made on various branches of analytical chemistry has been noted in previous reports. This month's report begins with a discussion of some recent applications in the agricultural field.

Pesticides and herbicides

A problem of considerable importance nowadays is the rapid detection of pesticide residues, particularly in consignments of foodstuffs awaiting distribution. Coulson[1] and co-workers have developed a method of screening based upon separation by gas chromatography followed by coulometric determination. The method has been applied to the quantitative determination of γ-BHC, aldrin, dieldrin, DDT, chlordan, endrin, toxaphene and various thiophosphates. It is claimed that a single determination takes only 1 hr., although this takes no account of the preparation of the sample in a suitable form to apply to the column. Such a method clearly holds possible advantages over biological methods of screening which are, at the present time, virtually non-specific. Another application of the technique to the determination of pesticide residues is one in which thiodan, after extraction from plant material, is separated from interfering material by a gas chromatographic method and is then determined by infra-red spectroscopy.[2] Higson and Butler[3] have described the application of gas-liquid chromatography to the determination of α-(4-chloro-2-methylphenoxy) propionic acid in commercial chloromethylphenoxypropionic acid which may contain related mono-, di- and unchlorinated acids. The butyl esters of the acids are formed by treatment of the sample with *n*-butyl alcohol containing dry hydrogen chloride and are then analysed by gas-liquid chromatography, dimethyl phthalate being added as an internal standard. The results recorded show that the method is a reasonably reproducible and accurate procedure for the routine examination of commercial acid and formulations.

4-Chloro-2 methylphenoxyacetic acid has also been determined by gas chromatography by Gardner and Overton.[4] These authors selected a modification of the Fischer-Speier method of methylation to produce suitable esters for gas chromatography. This procedure is of advantage because the 2 : 6-substituted chlorobenzoic acids which may be present remain unesterified whereas 4-chloro-2 methylphenoxyacetic acid esterified to the extent of 98% within 30 min. The chromatography is carried out on a vacuum grease column at 190° with ethyl benzoate as an internal standard.

Organic phosphate pesticides have been examined by infra-red spectroscopy and consideration has been given to the possible application of such a technique to the problem of residue analysis.[5] Six dithiocarbamates have been separated by a paper chromatographic method, detection on the paper being carried out by the sodium azide-iodine reaction for thiols.[6] Skerrett and Baker,[7] continuing their investigations into methods of determining dieldrin and endrin residues, have now developed a method for endrin based upon the formation of a dinitrophenylhydrazone after preliminary conversion to a ketone by treatment with an acetic acid-sulphuric acid mixture. Attempts to apply this method to the determination of endrin on plant materials have so far been unsatisfactory because of high blank values.

Fine chemicals

A problem of great concern to many analysts is the destruction of organic matter before determining trace inorganic constituents. Available methods have been carefully assessed by a sub-committee of the Analytical Methods Committee of the Society for Analytical Chemistry.[8] Various procedures for both wet and dry decomposition have been investigated and the applicability and limitations of each of the methods is discussed. Another subcommittee of the same organisation has reported on the determination of small amounts of arsenic in organic matter.[9] The work carried out has involved a critical assessment of the molybdenum-blue method and of the Gutzeit method. Although the former method is more accurate the Gutzeit method has been revised to bring it up to date and to widen its scope and is suggested as a recommended procedure, since it is less intricate and time-consuming than the molybdenum-blue method and is probably quite adequate for most limit test requirements.

Chloramphenicol has been determined[10] by reaction with excess of propionic anhydride in the presence of toluene-*p*-sulphonic acid at room temperature. Residual anhydride is then determined by addition of excess aniline and titration of unchanged amine with perchloric acid in an anhydrous medium. The method is also applicable to monoesters of chloramphenicol and to a number of its preparations. A chromatographic method has been developed for the separation of various chlorpromazine derivatives.[11] Previous methods have been reported whereby chlorpromazine could be separated from related compounds, but the work of Eisdorfer and Ellenborgen goes further in that the nine possible derivatives which can result from the oxidation or demethylation of chlorpromazine have all been resolved.

Phenoldisulphonic acid has long been used for the determination of nitrates and such substances as

Apparatus for the semi-automatic colorimetric determination of penicillin in broths. The method described[27] requires accurate measurement of seven reagents, a liquid/liquid extraction, evaporation of a solvent and determination of an optical density.

glyceryl trinitrate. Recent work by Hora and Webber[12] has shown that the determination can be seriously affected by the presence of ammonium ions. Many official procedures have made use of ammonium hydroxide during colour development and it would therefore seem desirable that these methods should be reviewed in the light of the new information available.

Drugs and pharmaceuticals

Quantitative application of the potassium bromide disk technique to the infra-red analysis of various substances of pharmaceutical interest has been examined.[13,14] These include certain steroids, barbiturates and alkaloids. Forty-one possible substitution derivatives of barbituric acid have been investigated in a survey of paper chromatographic methods available for their separation.[15] Using benzene-chloroform (1 : 1) as descending solvent on a paper impregnated with formamide it is claimed that di- and trisubstituted derivatives are separated more effectively than by previously described methods. Barbituric acid itself and mono-substituted derivatives do not move in this system and are subsequently eluted and separated with other solvents. A method for the determination of phenacetin in tablets has been suggested,[16] based on quantitative conversion to nitrophenetidine by nitration and subsequent saponification with sodium hydroxide. It is claimed that the method is sensitive and accurate and that it can be applied without previous separation of other ingredients such as caffeine.

A paper chromatographic technique has been used in studying the stability of apomorphine.[17] An oxidation product is formed in unstabilised aqueous solution and this can be separated from the parent substance with a butanol-acetic acid-water (4 : 1 : 5) system. Dragendorff's reagent gives an orange spot with apomorphine and a green one with the decomposition product.

Belles and Littleman[18] have described a differential method for determination of isoniazid and acetylisoniazid when they occur together. Both exhibit U.V. absorption at 265 mμ in acid solution and at about 300 mμ in alkaline solution; isoniazid makes the complete shift to 300 mμ at *p*H 10, however, and acetylisoniazid remains unchanged until *p*H 12.

Paper chromatography has also been employed in the comparative study of the constituents of heparin from different sources, a system having been devised which will separate heparin itself from related mucopolysaccharides.[19]

The Joint Committee set up by the Pharmaceutical Society of Great Britain and the Society for Analytical Chemistry to study the assay of crude drugs has issued a further report, this time on the determination of rauwolfia.[20] The recommended method is based upon extraction of the weakly basic alkaloids followed by their colorimetric determination by the sodium nitrite method[21] and results on various species of rauwolfia root show an inter-laboratory coefficient of variation of between 1 and 2·7%. The marked effect of temperature on the rate of colour development is particularly stressed in the report.

Steroids

Diosgenin is an important starting material in the manufacture of many steroid hormones. An elegant method of determining crude diosgenin based on fractional sublimation has been proposed.[22] Fifty mg. of the crude material is placed in a glass tube about 1 cm. in diameter and 25 cm. in length. The tube is then immersed to a depth of about 4 cm. in an oil-bath heated at 180° and is subjected to high vacuum. Diosgenin and volatile impurities sublime leaving a non-volatile residue in the bottom of the tube. The temperature of the oil-bath is lowered to 160° and the tube is immersed further so that the sublimed material is now below the level of the oil. Volatile impurities sublime higher up the tube leaving pure diosgenin in the central zone. The tube is then cut and the portion containing the diosgenin is weighed before and after treatment with an organic solvent. Results obtained by this procedure agree well with those obtained by chromatographic and counter-current methods.

The method of determining 17-hydroxycorticosteroids using tetrazolium salts, originally described by Mader and Buck,[23] has been critically examined by Johnson, King and Vickers.[24] It has been shown that atmospheric oxidation has an important influence on the extent of colour development. If the colour is developed in an atmosphere of nitrogen the optical density of a solution containing a given quantity of corticosteroid is distinctly higher and much more stable than when developed in air.

Antibiotics

The colorimetric determination of penicillin as the ferric hydroxamate complex has been reconsidered by Hungarian workers[25] who have made use of iso-butyl alcohol to extract the complex. The organic phase is suitably diluted and its optical density measured at 470 to 480 mμ This method is reported to be suitable for preparations of penicillin and particularly for fermentation solutions. Other workers[26] have used this type of reaction with a Technicon Autoanalyser to carry out the continuous determination of penicillin in fermentation media

and results are said to agree satisfactorily with those obtained microbiologically. In another automatic system which has been described[27] it is claimed that two assistants can between them perform 400 assays in a day. The iodimetric assay of penicillin has been examined with particular regard to interference caused by the presence of degradation products.[28] This error is insignificant if 75% or more of the penicillin present is still active, but increases in more degraded samples.

Use has been made of a Sakaguchi type reaction for the determination of viomycin.[29] The solution is cooled to below 5°, potash and 8-hydroxyquinoline solution are added and, after shaking, sodium hypobromite. The mixture is shaken, pyridine is added as a stabiliser and the optical density of the solution is measured at 507 mμ. Agreement with microbiological assay is good. The biuret reaction has been applied by Kartsera and Bruno to the determination of polymyxin.[30] Copper sulphate and sodium hydroxide solutions are added to 10 ml. of solution containing between 500 and 1,500 μg of polymyxin per ml. and the optical density of the clear solution is measured after removal of the copper hydroxide.

Vitamins

The biological potency of vitamin-A preparations has been assessed by the antimony trichloride method applied both before and after treatment with maleic anhydride.[31] Only those isomers in which the 2 : 3 and 4 : 5 double bonds are both *trans* give this reaction. The sample is saponified with ethanolic potash and extracted with diethyl ether. An aliquot of the dried ether solution is evaporated, the residue dissolved in chloroform and treated with antimony trichloride solution. Immediately after mixing, the optical density of the solution is measured at 620 mμ. A second aliquot is evaporated and the residue dissolved in benzene and treated with maleic anhydride for 16 hr. at 25°C. (both time and temperature are critical), diluted with chloroform and then treated with antimony trichloride solution as before. From the values obtained the potency can be estimated and results on six vitamin-A containing preparations agreed well with those obtained by biological assay.

Thiamine, riboflavine, pyridoxine and nicotinamide have been separated by ascending paper chromatography with a system consisting of *n*-butanol - acetic acid - water (4 : 1 : 5).[32] Thiamine is detected with a modified Dragendorff reagent, riboflavine with sodium hydroxide solution, pyridoxine with sulphanilic acid followed by sodium carbonate and nicotinamide with 1-chloro-2 : 4-dinitrobenzene. Using the technique of "thin-layer" chromatography, which is carried out on plates coated with silica gel, German workers have separated ascorbic acid and a number of vitamins of the B group, including thiamine, pyridoxine, riboflavine, calcium pantothenate, nicotinamide and biotin.[33] Shaw and Bessell have published a comprehensive and critical review of methods of determining vitamin B_{12}.[34] The survey covers methods of separation and pre-treatment as well as physical, chemical, microbiological and clinical assays and gives 174 references.

A spectrofluorimetric method for the determination of total and esterified tocopherols in tissues has

HUMIDITY UPSETS MICRO-BALANCES

Equipment used by the U.S. National Bureau of Standards to study the effects of humidity on the rest point of micro-balances. Air was circulated through balance and over water and humidity read from an electric hygrometer (sensing elements in front left corner of the case).

In microanalysis the errors due to weighing are often significant. The identification and reduction of these errors, such as that due to humidity, will increase the usefulness of microanalysis. In a recent study conducted by H. E. Almer, of the U.S. National Bureau of Standards, the effects of changes in humidity upon four balances of different design were determined. Two of the balances were of two-pan, equal-arm construction, and two were of the one-pan, direct-reading type. The humidity in the balance case was determined by an electric hygrometer. The balance indication was recorded for a short period to show the performance under room conditions. Moist air was then introduced into the balance case. After this the balance indication was recorded while the moisture escaped from the case and the air enclosed returned to ambient conditions. When large changes in rest point were noted, the balance was carefully cleaned, including the removal of lacquer and excess cement. The test was then repeated.

Each of the balances tested reacted to changes in relative humidity, reaching a new rest point quite rapidly. The magnitude of this change was different for each balance, one actually going off scale during the test. The effect on this balance was greatly reduced by removal of lacquer and excess cement. The performance of another balance that showed large deviations improved after cleaning. Changes in rest point ranged from over 8 g. for each per cent. humidity change before treatment to 0·8 g. after treatment.

The investigation showed that moisture can collect on a balance through absorption by hygroscopic materials such as lacquer, cement and dust, and by adsorption on all surfaces. To improve the performance of microbalances, the use of hygroscopic materials should be eliminated wherever possible, and balance parts should be kept free of foreign matter. Design considerations should include uncompensated differences in the coefficient of adsorption, and correction for inequalities in the surface area on either side of the beam.

The response of a balance to changes in relative humidity is unpredictable, and can be determined only by testing of individual instruments. "Response of microchemical balances to changes in relative humidity," H. E. Almer, *J. Research NBS*, 1960, **64C,** 281.

been described by Duggan.[35] Total tocopherols are extracted into hexane and one portion is diluted with ethanol for determination of free tocopherols by the fluorescence at 340 mμ after activation at 295 mμ. The esterified tocopherols in another portion are hydrolysed with lithium aluminium hydride and the resulting free tocopherols are determined as before to give a value for the total.

Fixed oils

Gas-liquid chromatography, already a powerful tool in the examination of volatile oils, is now being used to study the fatty-acid composition of vegetable oils. Craig and Murty[36] have examined six vegetable oils and two synthetic mixtures. The theoretical iodine values calculated from the fatty-acid contents determined were in good agreement with measured iodine values. Other American workers[37] have compared results obtained on mixtures of pure fatty-acid esters and on a series of fats and oils and have compared results with those obtained by an alkali-isomerisation ultraviolet method. Promising results have been reported.

An electrometric method for the determination of iodine values by direct titration has been reported.[38] A 0·15 N solution of bromine in acetic acid is used as titrant with a twin platinum electrode. Precise results are claimed although they are, in general, lower than those obtained by the Wijs, Hübl and Hanus methods.

Changes which may occur when oils are refined are of considerable interest. Lauber[39] has developed a method based upon electrical conductivity measurements to distinguish between refined and unrefined oils. The latter have a higher electrical conductivity due to greater acidity and to the presence of phosphatides. Martinenghi[40] has shown that the iodine value of the unsaponifiable matter is an unreliable guide in detecting adulterated olive oil, particularly those which have been refined or esterified. Vigorous deodorisation can raise the iodine value of the unsaponifiable matter of arachis oil or of tallow to that of olive oil.

Autoxidation of oils, particularly those containing olefinic acids, causes formation of hydroperoxides which themselves give rise to peroxides and carbonyl compounds. The standard iodimetric procedure for determination of autoxidation measures only the hydroperoxides, but Täufel and Zimmermann[41] have obtained fuller information by carrying out three determinations. Peroxide number, carbonyl compounds and malonaldehyde are all determined and the results obtained allow a more comprehensive assessment of the degree of autoxidation to be made. Infra-red spectroscopy has also been applied to the determination of degree of autoxidation, increases in absorption in the regions 10·36 μ and 2·9 μ being obtained due to the presence of —OH and —OOH groups.[42]

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GLYCERINE IN TOILETRIES

Patents examined by the Glycerine Producers' Association have disclosed a variety of claims for cosmetics and toilet preparations incorporating glycerine, *e.g.*:

A cosmetic cream with androstane having no hormone activity.—Swiss 330,670.

An aerosol shampoo of a higher fatty monoglyceride sulphate, with a foam booster.—U.S. 2,879,231 and 2,875,153.

Glyceryl monomercaptan in a rapid, non-toxic, non-odorous permanent waving composition which can be easily removed by water alone.—U.S. 2,889,833.

Hair-treating composition containing a beef marrow extract for use in shampoos, scalp lotions and dyeing compositions.—Fr. 1,180,932.

Solidification of glycerol and glycerol solutions for use in cosmetics. Ger. Appln. 1,045,600.

Extremely stable shampoos which prevent excessive drying of the hair can be formulated as either liquids or creams.—U.S. 2,871,193.

A clear, jelly-like dentifrice based on a water-soluble acrylic resin swelled with water.—Jap. 1,150/57.

Solubilisation of lanolin for use in aqueous cosmetic compositions.—Belg. 569,111.

Two cleansing creams are described: the first to remove cations and the second to remove anionic dirt. Jap. 6,300/57.

FERTILISERS and Plant Nutrients

By D. P. Hopkins, B.SC., F.R.I.C.

Fertilisers use in Scotland ● Manganese deficiency ● Cobalt as a plant nutrient ● Sodium ● Phosphates ● Soil analysis ● Urea condensation products ● Superphosphate and ammonium sulphate processes

Scottish surveys

SCOTLAND did not begin surveys of fertiliser practice until 1956 and there has not yet been a collective report bringing together the various district survey results. However, an excellent summary has appeared in the form of a paper[1] and this covers principal results of district surveys from 1956-58, in which period 18 different districts were investigated. The paper covers only oats, potatoes, turnips and grass—the main crops; for fertiliser practice on other crops, actual district survey reports must be consulted.

In eastern districts between 60 and 80% of oats received nitrogen, phosphate and potash; in northern districts, phosphate is given to about 90% or more of the acreage, but the percentage getting nitrogen and/or potash varies from district to district. In western areas the percentages were exceedingly variable, e.g. from 18 to 92% for nitrogen dressings. When rates of application to the actually fertilised acres are considered, there is much less variation even by regions. Nitrogen was mostly applied at 0·20 to 0·25 cwt./acre; phosphate (as P_2O_5) from 0·3 to 0·6 cwt./acre; potash was mostly used at 0·25 to 0·4 cwt./acre. The extent to which farmers in Scotland use fertilisers on oats is, of course, important; there, oats is the major cereal. But oats are not as highly responsive to nitrogen as wheat and barley, nor with oats have modern varieties arrived with such strikingly improved responsiveness as, say, Proctor barley. If the crop's poorer reaction to fertilisers is borne in mind, the acreage percentages getting NPK dressings and the average rates given to fertilised land are fairly satisfactory; certainly there is no excessive evidence of fertiliser neglect.

With potatoes and with turnips (or swedes), crops grown on most Scottish farms in the surveys, practically all the acreages received nitrogen, phosphate and potash. For potatoes rates per acre lay between 0·65 and 1 cwt. N, 0·9 to 1·1 cwt. P_2O_5, and 0·9 to 1·6 cwt. K_2O. For a few districts rates were much higher, *e.g.* Ayr, or much lower *e.g.* Orkney. The importance of the crop varied; on some farms grown only for home use, on others perhaps only a part of the crop was important, for seed potato production or for the early market. Rates given to turnips and swedes were also fairly uniform —0·2 to 0·6 cwt. N, 1 to 1·75 cwt. P_2O_5, and 0·3 to 1 cwt. K_2O. The somewhat lower sides of these ranges were found mostly in northern districts. In some western districts over 2 cwt. P_2O_5 an acre was given, but in the form of basic slag, not as water-soluble phosphate.

Cut grass was more uniformly fertilised than grazed grass. For both kinds, however, the percentages of acreage getting fertiliser varied considerably. On the whole, it might be said that, proportionately, more grassland gets fertiliser in Scotland than in England and Wales. Enlarging the Anglo-Scottish comparison, the general crop and grass results show that certain regions in England use more nitrogen and potash than Scotland—these are the Eastern, S.E., Yorkshire and Lancashire regions. Wales and S.W. English regions use less nitrogen and potash than Scotland. For these two fertiliser nutrients, other regions in England closely resemble Scotland. But with phosphate, Scotland uses considerably more per acre than any of the English regions, even twice as much as the S.E., the S.W. and the East Midlands. It is, of course, well known that phosphate deficiency is a more widely found defect of Scottish soils.

Manganese deficiency

Also from Scotland is a new paper[2] on manganese deficiency, often encountered with the oats crop as " Grey Speck " disease. The cause of deficiency is usually insufficient soil acidity to keep the soil's manganese available; thus, the disease is mostly found in soils whose *p*H is 6·3 or more. Broadcast dressings of manganese sulphate have failed to cure the trouble as the added manganese itself becomes speedily unavailable. Spraying the young crop with manganese sulphate solution has been hitherto the most reliable cure. The new work has examined drill-placement of solid manganese sulphate in the row with the seed and this has shown that good results can be consistently obtained by this method. The placed manganese sulphate is not as quickly " fixed " by the antagonistic soil. In some tests the increase in yield of oats by this method was 6 cwt./acre compared with 3 cwt. increases from spraying; in any case, drilling is far cheaper than spraying. Even where manganese deficiency has not previously occurred, drill-placed seed-row manganese sulphate may appreciably raise oats yields; but this should not be attempted on acid soils, for then the increased supply of manganese may be excessive and plant-toxic.

Cobalt—plant nutrient?

Though essential in animal nutrition, cobalt is not listed as an essential plant nutrient. Two recent contributions[3, 4] have presented evidence that cobalt may be essential for leguminous plants. The first contribution showed that trace supplies of cobalt led to large increases in weight of plant, and in the plant's nitrogen content, for lucerne. The second paper has shown that nutrient solutions devoid of cobalt cause severe nitrogen deficiency with soya beans; 25% of the non-Co-fed plants died. It is important to explain that in both investigations these leguminous plants were grown symbiotically, *i.e.* without added nitrogen but with inoculations of suitable leguminous bacteria. They were dependent, therefore, on nitrogen fixation by nodule bacteria for their own nitrogen. For this natural process of leguminous plants to operate, it now appears evident that cobalt is an essential trace require-

An oat crop treated with manganese sulphate by placement along with the other fertilisers. In the foreground an untreated area is shown. Grey Speck in the untreated areas resulted in complete crop failure.

(Courtesy: Fertiliser and Feeding Stuffs Journal.)

ment. It might also be added that the " trace " amount needed in the soya bean tests was only 1 part of Co in a billion! Indeed, this particular piece of U.S. research is an excellent example of the delicacy of trace element investigation; thus, to ensure that the cobalt-removing technique was efficient in preparing nutrient solutions free from cobalt, radio-labelled Co^{60} was used. Previously known facts about cobalt in plants and plant substances can be linked with this new indication. In the 1940s it was shown that clovers were usually richer in cobalt than grasses; this is to be expected if cobalt is essential for leguminous plants but not for others. Also, it is now known that cobalt is a component of the vitamin B_{12} molecule. It may be necessary for the nodule bacteria of leguminous plants to manufacture this vitamin for their own metabolism. If so, then it is essential for them to have a source of cobalt.

Sodium again

From time to time attention is drawn to the significance of sodium as a response-obtaining nutrient for certain crops, and this year two papers by the same worker[5,6] have shown that turnips and kale both give yield increases for sodium applications. Evidence that turnips are sodium-loving has been put forward before; but the kale-sodium association is new. In each of four tests salt raised turnip yields more than muriate of potash; and in five out of six tests, on soils not potash-deficient, salt raised kale yields by about 1 ton/acre. Turnip yield gains were from 1·75 to 2 tons of roots for 4½ cwt. of salt an acre in three of the four tests; in the fourth test the yield gain was lower at ¾ ton. The yield gains for tops were considerably less marked.

The author discusses the possibility that the benefit of sodium may be associated with a stimulated uptake of phosphate. With turnips, the use of superphosphate reduced the responses to salt. In all the tests the use of salt increased the uptake of phosphate in both turnip roots and tops. On the other hand, similar associations between phosphate and sodium were not shown in the tests with kale.

In another paper on grass and the effects of nitrogen upon mineral uptake[7] it has been shown, as one of several results, that ryegrass's sodium content was consistently increased following the application of nitrogen (as ammonium nitrate). Contents were measured in three cuts of the grass over two seasons, and this N-stimulated rise in sodium content was found for all cuts. Applications of potassium (as sulphate), however, depressed sodium contents at all cuts. A similar nitrogen-sodium relationship was found in the above work with kale, but not with turnips. For both turnips and kale, the strong capacity of potash fertilisers to depress sodium uptake was observed.

More effort in the direction of sodium and salt research has been called for,[8] and the fact that beneficial results from sodium supply have often been found when such work has been carried out ought not to be under-rated. A country so well endowed with cheap supplies of salt should be particularly energetic in investigating its potentialities as a fertiliser. The fact that potash depressed sodium uptake may often have obscured sodium responses. Lowered rates of potash plus salt may for some crops, besides the known case of sugar beet, lead to better responses. Salt, too, may have special advantages on phosphate-low soils.

Phosphates

Two papers, one French[9] and the other American,[10] have produced evidence to query the modern view that past and regular attention to phosphatic fertilisation has often been excessive. In the French work the yields of several crops grown on a rich soul declined after five years' abstention from annual phosphate dressings, but there were no falls in yields when superphosphate had been given each year in amounts equivalent to crop uptake of phosphate. The fact that amounts only equal to uptake were adequate may be typical of the French soil used, and the conclusion is drawn that soil fixation is an unimportant influence. It can be doubted whether a similar conclusion could be drawn for most British soils which in general have stronger P-fixing capacities. The U.S. work studied the phosphate needs of potatoes—in pot tests the amounts and timing of phosphate applications were widely varied. It was emphatically shown that potatoes have a strong phosphate need for tuber development and that the main demand for phosphate comes early in plant life. There is an initial

accumulation of phosphate in the stems and foliage, but this later moves heavily into the tubers. Most of the potato's phosphate requirement must be available at an early stage, though the main effect upon yield comes later. It is reasonable to deduce from this work that there is a critical requirement for *available* phosphate within the first few weeks; the amount of fertiliser phosphate required should, therefore, be judged in terms of this *timed* supply of the available nutrient, not only in terms of the total P uptake of potatoes. Risking a low level of phosphate supply for this crop, as is now often advocated may, for small economy, be risking failure to provide this early threshold amount of assimilable phosphate. The implications of this U.S. work with potatoes have also been strongly developed by Sauchelli.[11]

New tests for nutrients

Any guidance to be obtained from soil analysis, even assuming that sampling variations do not interfere, depends upon the consistency with which nutrient-extracting solutions give results that correspond with actual crop-growth results with the tested soils. It is not always realised, seldom so by farmers, how assumptive and empirical soil analysis has to be. A new paper from Kenya[12] has compared ten different methods for extracting phosphate from soils; and of the various assessments for available soil-P obtained, only the total organic P and the inorganic P extracted with hot 0·1N caustic soda could be reliably correlated with crop responses. The organic P fraction with these soils accounted for 86% of total soil-P, and it is argued that the main source of phosphate in soils is the P-containing organic complex matter and not the water-soluble portion of soil phosphate. It may be dangerous to extend this sweeping view to all soils; many may be considerably lower in organic content and therefore also lower in their proportion of organically-held soil P.

A second paper[13] also mentions sodium hydroxide (NaOH) as an extractant. In forty-eight tests on garden soils—soils widely differing in kind, nitrogen contents and *p*H—incubation tests for available N could be correlated with the amounts of N shown by the quantities of ammonia released by NaOH treatment. Since incubation tests, hitherto regarded as the only reliable tests for available N in soils, are cumbersome and time consuming, this much simpler method of chemical testing may be valuable. It may be used as an initial screening test for soils with the incubation type of test used only for soils giving abnormal results. Further work to develop this new method's reliability seems necessary.

Urea condensation

The search for a synthetic slow-acting nitrogen fertiliser has been extended by British work[14] in which methylene-urea condensation products have been tested. These, of course, resemble the much better known formaldehyde-urea polymers. The following were laboratory prepared by acid-reaction condensation: methylene di-urea, dimethylene tri-urea, trimethylene tetra-urea, tetramethylene penta-urea. Soil incubation tests showed that the first two products decomposed far too quickly in soils to have useful fertiliser value. The last was, by contrast, too strongly resistant to soil breakdown. Only trimethylene tetra-urea indicated any promise as a fertiliser material, but in general it was concluded that this family of urea condensation products was unlikely to yield the badly needed, non-organic, slow nitrogenous fertiliser. This need certainly increases, for the most-used slow nitrogen fertiliser, hoof and horn meal, steadily becomes shorter in supply here and in consequence dearer in price.

Speedy superphosphate process

A Formosa-Chinese paper[15] has described a new low-acid and speedy superphosphate process, so far developed on a small scale only. Rock phosphate is acidulated at a ratio of 1·9 to 2·1 moles of acid per mole of P_2O_5; the product is autoclaved and concentrated, and the final superphosphate has 11 to 15% water-soluble and 3 to 7% citrate-soluble P_2O_5 content. The total reaction time is 10 hr. including conversion as against several weeks for normal superphosphate including curing time. Up to plant-scale sized tests in TVA work[16] have used the new superphosphoric acid for treating rock phosphate. The most favourable conditions were obtained with an acid of about 74% P_2O_5 content and by pre-heating this acid to 180°-225°F. The maximum temperatures reached in the subsequent pile of superphosphate were 300°-350°, attained in about 40 min. This high temperature favoured fluorine volatilisation and speedy conversion of insoluble P_2O_5. 54-56% superphosphates were produced, most of the P_2O_5 being present as monocalcium phosphate. The removal of fluorine was about four times as much as that in ordinary manufacture of triple superphosphate. Some bagging troubles were experienced, attributed to the continued slow evolution of fluorine. To overcome this, it might be necessary to market the product in slightly ammoniated form.

Ammonium sulphate process

A new process operating in Spain for manufacturing ammonium sulphate has been described.[17] The sulphur oxides from pyrites roasting are absorbed in a basic organic solvent; this solution is then air-oxidised, converting the sulphur oxides into $—SO_3$, and ammonia gas is then introduced. The formation of ammonium sulphate and the regeneration of the organic solvent occur simultaneously.

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Perfumery. "We invite you . . ." is the name of a beautifully produced publication from Dragoco of Holzminden, which describes in words and pictures the extensive perfumery manufacturing facilities the firm has built up. The booklet is printed in five languages and most of the pictures are in full colour.

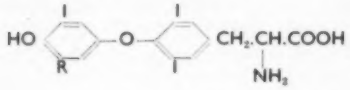
HORMONES

By R. M. Evans,* D.SC., F.R.I.C.

Thyroid hormone analogues ● Queen substance ● 9α-Fluorosteroids
New synthesis of aldosterone ● Parathyroid hormone

Thyroid hormone analogues

SEVERAL population studies[1] carried out during the past 10 years have demonstrated a relation between serum cholesterol levels in man and the incidence of atherosclerosis. Hypercholesterolæmia has been shown to be common in patients with coronary artery disease, and there are indications that concentrations of some of the lipoproteins are unusually high in men who subsequently suffer a myocardial infarction.[2] Although these studies have not provided proof of a causal relation between elevated serum cholesterol levels and the development of coronary artery disease, it has been argued that a depression of serum cholesterol levels may be of benefit in the prevention or alleviation of atherosclerosis.



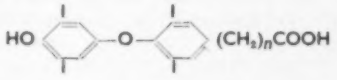
Serum cholesterol levels can be influenced by a number of hormones, in particular the œstrogens and the thyroid hormones, L-thyroxine (I, R = I) and L-triiodothyronine (I, R = H).[3] Compounds of neither group are, however, satisfactory for the treatment of hypercholesterolæmia because of their undesirable side effects. At dose levels effective in lowering the level of serum cholesterol, the œstrogens tend to produce feminising effects in males, and the thyroid hormones cause an increase in basal metabolic rate associated with greater myocardial oxygen requirements. In patients suffering from coronary artery disease the blood supply to the heart is probably reduced, and any rise in oxygen demands may result in increased anginal pain. The thyroid hormones also are therefore unsuitable for treating this condition.[4]

In previous reviews[5] the effects of structural modifications on the biological properties of cortical and androgenic hormones have been described; it is clear that altering substituent groups can accentuate certain properties of hormones and depress others.

It therefore seemed reasonable to investigate the effects of modifying the structure of the thyroid hormones in an attempt to prepare analogues with enhanced hypocholesterolæmic action but reduced ability to elevate the basal metabolic rate.

In all investigations of this type it is first essential to establish suitable methods for screening the compounds and for this purpose the rat has proved to be a suitable test animal. A hypercholesterolæmic condition can be readily induced by dietary control, and elevation of the basal metabolic rate may be estimated directly, by determining the animal's oxygen consumption rate, or indirectly, by measuring the relative change in heart weight.[6]

The first success in this field was achieved by Pitt-Rivers and Trotter,[7] who found that replacing the alanine side-chain of triiodothyronine (I, R = H) by a carboxymethylene group gave an optically inactive analogue which, when compared with L-thyroxine, showed an appreciable increase in hypocholesterolæmic activity relative to the increase produced in the basal metabolic rate. Many other analogues of thyroxine have since been prepared, and it has been found that the basic activities of the hormone are retained by a wide range of structurally related compounds.



Appreciable activity has been found in analogues in which the ether-oxygen has been replaced by sulphur; or the alanine side chain replaced by a carboxyalkylene side chain (*e.g.*, II, $n = O$, 1, 2 or 3); or an hydroxyl group at the 4′ position is lacking. The 3,5,3′-triiodo analogues are always more active than the tetraiodo compounds, whereas the 3,5-diiodo derivatives are less active. Substitution of iodine by other halogens diminishes activity but does not abolish it.[6,8] It is apparent that the L-amino acid side-chain of thyroxine is not essential to its basic activities and it is therefore not surprising that D-thyroxine also shows a pronounced hypocholesterolæmic effect.[6,9]

These structural modifications produce qualitative as well as quantitative changes in activities. The most promising compounds, among which may be included tetraiodothyroformic acid (II, $n = O$), D-thyroxine and their 3,5,3′-triiodo and 3,5-diiodo analogues, show in rat experiments a 5-15 fold enhancement of the ratio

$$\frac{\text{hypocholesterolæmic effect}}{\text{relative increase in basal metabolic rate}}$$

compared with L-thyroxine.[11]

It will be appreciated, however, that the hypercholesterolæmic state induced in rats by dietary control does not arise from the same causes as hypercholesterolæmia found in man; consequently the figures obtained in these assays can only be taken as a rough guide to potential clinical utility.

A number of the compounds mentioned above have been the subject of recent clinical trials,[9,10] but they have not yet been fully evaluated. Knowledge in this field is however advancing rapidly, and it seems possible that a suitable agent will be found among the compounds already under test or their close structural analogues.

Queen substance

It was observed by Butler[12] that queen honey bees secreted a substance that is distributed throughout the colony and exerts a marked effect on the development and behaviour of the worker bees. This secretion, which he termed "queen substance," prevents the development of ovaries in the workers and inhibits the construction of queen cells. In 1958 Butler and Simpson[13] demonstrated that the "queen substance" is contained in the mandibular glands of the queen bee and in the next year it was isolated as a crystalline solid.[14] More recently, Callow and Johnston[15] have shown the structure of this remarkable

* Glaxo Laboratories Ltd.

compound to be 9-oxodec-2-enoic acid (III).

$$CH_3.CO.(CH_2)_6.CH = CH.COOH$$
III

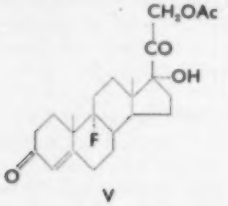
$$HO.CH_2.(CH_2)_6.CH = CH.COOH$$
IV

The structure has been confirmed by synthesis from methyl azelate, and the synthetic material behaved exactly as the natural secretion. Queen substance is structurally closely related to 10-hydroxydec-2-enoic acid (IV), one of the components of "Royal Jelly,"[16] a substance secreted by the mandibular glands of worker bees.

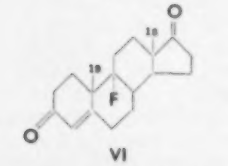
Synthetic 9-oxodec-2-enoic acid may prove to be of value to apiarists, as it may be possible to prevent swarming by introducing it into the hive. Study of its effects on other species will doubtless also be carried out.

9α-Fluoro-steroids

The enhancement of the biological activity of 11-oxygenated cortical hormones by introducing a fluorine atom into the 9α-position is well established.[17] Until recently, however, no 9α-fluoro-steroid lacking an oxygen function at 11 had been synthesised. This deficiency has recently been surmounted by Bergstrom and Dodson,[18] who have demonstrated that treatment of 17α-hydroxy corticosterone acetate with a solution of hydrogen fluoride in pyridine gives a mixture of 9α-fluoro-17α-hydroxydeoxycorticosterone acetate (V) and the corresponding Δ9(11) unsaturated steroid.

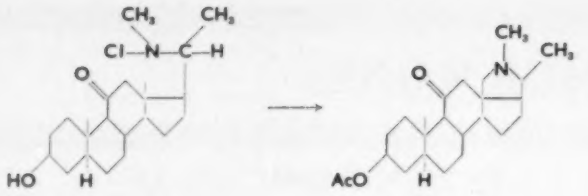


V



VI

The position of the fluorine atom has been established unequivocally, and the fluoro-steroid (V) has been proved to be 12 times as active as corticosterone acetate in producing sodium retention. It seems probable, therefore, that the enhancement of activity associated with the introduction of a 9α-fluorine substituent may not be caused by its inductive effect on the adjacent oxygen function, as had been suggested previously,[17] but by interference with the metabolic processes during which these steroids are degraded.[18]



VII VIII

It has also been found that 9α-fluoro-steroids behave differently from the parent steroids when subjected to biological oxidation by adrenal perfusion.[19] Under these conditions an 11β-hydroxyl group is usually introduced, but in 9α-fluoroandrost-4-en-3,17-dione (VI), for example, hydroxylation of one or other angular methyl group (C_{18} or C_{19}) occurs. These findings further emphasise the marked effects on the metabolism of steroids exerted by a 9α-fluoro-substituent and should aid studies of function and metabolism in the adrenal gland.

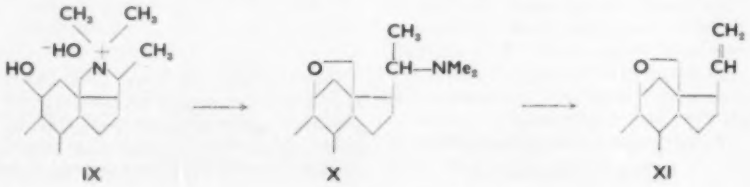
Aldosterone—a new synthesis

The novel approach to the synthesis of aldosterone, described in the previous review,[5] has been followed by announcement of a further successful synthesis.[20] The new route although more complicated, is particularly interesting for its new approach to the formation of the hemi-acetal ring structure of aldosterone, *via* intermediates related in structure to connessine, and for the elegant way in which many of the more recently developed techniques of steroid chemistry are deployed.

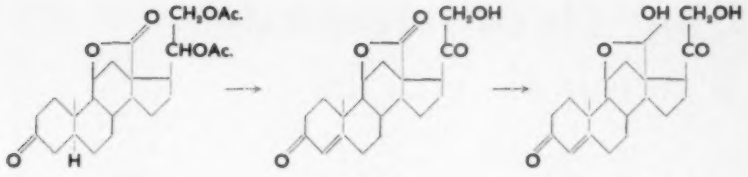
The chloramine (VII), obtained from 3β-hydroxy-5α-pregna-11,20-dione (a readily available intermediate in cortisone synthesis) by reductive amination and treatment of the product with sodium hypochlorite, was irradiated in trifluoracetic acid; cyclised by means of sodium hydroxide in methanol and acetylated to give the conanine (VIII). Reduction by lithium aluminium hydride gave the corresponding 3β,11β-diol which was transformed *via* the quaternary methiodide to the quaternary ammonium hydroxide (IX). On heating, this intermediate was transformed from a conanine to an 11β, 18-oxido-20-dimethylamino-steroid (X), which was further degraded by heating its methiodide with sodium methoxide in dimethylformamide to give the 17β-ethylenic compound (XI). Oxidation by chromic acid in acetone to a 3-oxo derivative, hydroxylation at positions 20 and 21 by osmium tetroxide, and acetylation to the 20,21-diacetate, were followed by oxidation with ruthenium tetroxide to convert the 11β,18-oxido-ring system into a γ-lactone (XII). The introduction of the Δ^{4} bond followed established methods, and the acetyl side chain was elaborated by hydrolysis to the 20,21-diol, selective formation of the 21-trityl ester, oxidation to the 20-oxo-derivative and hydrolysis of the protecting group at 21 to yield (XIII), which had been converted previously into aldosterone (XIV).[21]

A parathyroid hormone

The parathyroid glands are situated close to the thyroid gland and are concerned primarily with calcium and phosphorus metabolism. The first active gland extracts were prepared by Collip and Hanson 40 years ago; and this year Rasmussen and his colleagues[22] have isolated the hormone in a chemically pure state from gland extracts by countercurrent distribution extraction, chromatography and ultra-



IX X XI



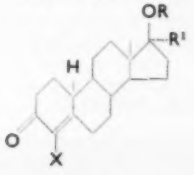
XII XIII XIV

centrifugation. The hormone has been proved to be a polypeptide with a molecular weight of *ca.* 9,250; it contains 84 amino acid residues from 17 different amino acids. It has a straight chain polypeptide structure; although the sequence has not yet been determined, it is known to possess a terminal D-alanine group. This last feature is interesting, since alanine is normally found as the L-isomer like other naturally occurring amino acids.

Rasmussen has also shown that a hormone antagonist is produced by modifying the methionine moieties of the molecule, and it may be feasible, when more information on the amino acid sequence is available, to synthesise simple analogues that will block the action of the hormone and be useful in the treatment of hyperparathyroidism.

Erratum

In the previous article of this series (August 1960) the depiction of a 14β-methyl group in formula II was in error and the formula should be:



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Ouch-Meter and Automatic Bacteriologist

The instant the rat moves his tail the photo-electric cell reacts to the movement and stops a timer. In this way the " Ouch Meter " checks the effectiveness of analgesics.

THE Upjohn Co. in the U.S. have developed two new automatic research instruments — an " Ouch Meter " and an " Automatic Bacteriologist," to aid pharmaceutical research.

The " Ouch Meter " tests physical reaction to pain to evaluate analgesics. The " Automatic Bacteriologist " checks and records the growth of 300 tubes of cultured micro-organisms every 2 hr. around the clock.

Each instrument utilises photo-electric cells. The " Ouch Meter " tests analgesics by giving a heat stimulus to a rat, after the administration of an analgesic, and recording the time elapsed until a physical reaction occurs.

The effectiveness of analgesics is determined by comparing reaction times of a large number of rats following doses of different analgesics.

The " Automatic Bacteriologist " — an " Automatic Recording Nephelometer " — monitors the growth of micro-organisms.

The instrument's photo-electric cell records on separate graphs exactly what is going on in each tube passing before it. Readings can be taken on each of 20 to 3,000 stirred cultures at intervals of 8 min. to 2 hr.

Controlling Health Hazards in Chemical Works

By V. A. Broadhurst, B.A.

Because of the inherent hazards of its work the chemical industry is one of the most practised exponents of industrial safety. But safety demands unceasing vigilance. It is everyone's business, not just the job of the safety officer. This article restates some of the first principles of industrial safety and emphasises the importance of supervision and attention to detail.

NOXIOUS substances are inseparable from many chemical processes. Skill and knowledge about safe handling of innumerable dangerous materials have developed and many once serious health problems have been effectively controlled. While cases of men being affected by fumes and gases are still reported and a small number of men are killed each year this way in British industry, great advances in control have been made. The words of a witness before a Home Office Committee of Enquiry in 1893 would no longer be true. Speaking of a chemical works, he said, "Gassing is such a common matter that the men describe its symptoms as they would tell you what their Sunday's dinner was like."

While much more is known about protecting personnel from this and other recognised kinds of hazards, the development of new pharmaceuticals, fine chemicals and other products has produced new hazards, sometimes from the raw materials and at other times from the by-products or end products.

There has been a great increase in the manufacture of pharmaceuticals and fine chemicals, many of which are extremely complex and pass through numerous stages of preparation. While the use of modern plant and new processes has often substantially reduced the danger to persons employed, many health problems in fact remain and others have been introduced unavoidably.

In one of his annual reports the Chief Inspector of Factories said, "Quite apart from the chemical risks associated with manufacture, it is often necessary to protect persons against the finished product, as in the case of drugs which, in the concentrated form, are toxic. For example a possible health hazard was discovered when a man was found grinding a drug, using a respirator to prevent the inhalation of the dust. This was not proving effective and the occupier (of the factory) was supplying another drug to counteract the one being packed. Good exhaust ventilation was the correct answer to the problem and this was subsequently provided."

Recognising a hazard

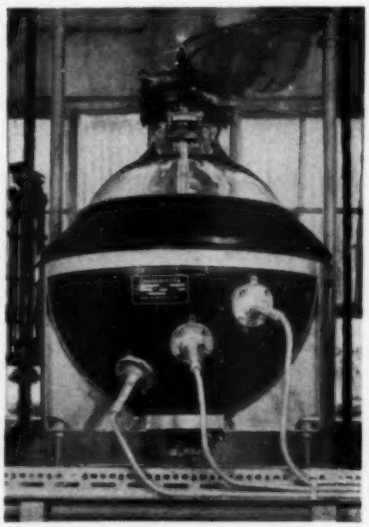
The first step towards the control of an industrial hazard is its recognition, followed by a fuller understanding of its nature. For instance, post-war reports made as a result of research work instituted by the Association of British Chemical Manufacturers showed that there was a statistically significant increased incidence of bladder tumours among workmen exposed to benzidine, α-naphthylamine and β-naphthylamine. The hazards of bladder tumours are now well recognised by chemical manufacturers and special precautions are taken.

Sometimes familiarity with a substance has obscured the fact that it is in some way dangerous; or perhaps health effects are not apparent for a considerable time and adequate precautions are not taken meanwhile. A careful appraisal of new materials and processes, in particular, is called for in view of the many substances which have been recognised as hazardous in at least some circumstances.

It may be only a relatively small change in a process which introduces a hazard. In a dyestuffs and chemical works, four cases of notifiable aniline poisoning arose within about five weeks of a change in a process. Crude anthracene was refined, the impurities being removed by dissolving in pyridine bases. But a new source of those bases with a higher boiling point had been intro-

FLAMEPROOF ELECTRIC HEATING MANTLES

Isopad Ltd. produces a special range of electric heating mantles which are designed in accordance with the Factory Act and which have been accepted by the authorities for use in inflammable areas. Among these are flameproo mantles for pilot glass plant up to 200-litre capacity. Mineral insulated metal sheathed heating elements are used which terminate in flameproof glands and Buxton certified junction boxes. The element sheath is earthed through the flameproof junction box so that no spark or short circuit is possible even in the event of spillage. The temperature of the heating element must be kept below the spontaneous ignition temperature of the vapours or gases present. This can be achieved by choosing the correct wattage to keep below maximum temperature where compensation for heat loss or slow heating is required. A full range of manual and automatic controls is available for that purpose.



DISPERSAL OF INFLAMMABLE SPILLS

A new chemical hydrate emulsion, called Slix, *now manufactured and marketed in the U.K., is claimed to give 100% effective, safe control and immediate dispersal of inflammable spills. The product contains no solvents, is odourless, non-inflammable and non-toxic. It is described as a highly penetrating, anti-coalescing agent which shatters the oil film into globules, chemically coating each droplet and isolating it with an area of non-combustible water of hydration. After application of a* Slix*/water solution, the spill is easily dispersed into drains and sewer systems with a stream of water. The* Slix*/spill emulsion is no longer inflammable, and the oil or volatile solvent will not be deposited on sewer walls, ships, dock pilings, etc. When applied as a coarse spray and agitated, it controls the vaporisation rate of petrols, etc., and prevents an explosive concentration of fumes forming.*

duced owing to the demands for increased production. Only later was it appreciated that the solvent used contained 55% to 88% aniline.

An example of an unsuspected hazard in a photo chemical works came to light in an unusual way. One of the employees, finding some defect in his eyesight, consulted an ophthalmic specialist. It was found that the cornea was stained, and when the eyes of the other workers were examined subsequently, similar symptoms were evident. It transpired that harmful fumes in the atmosphere were doing the damage. Hydroquinone was being manufactured and materials being handled in the processes included aniline and bichromate. The men's eyesight was being affected by the absorption of minute particles soluble in water and fats. Appropriate precautions were then taken to deal with the problem.

Substituting safer materials

Whilst the substitution of one material for another may introduce a hazard, the opposite is also often true. By substituting a safe or less dangerous substance for a known dangerous one, a hazard may be reduced or eliminated. Substitution of this kind is obviously the best way of mastering industrial health hazards. Examples are the substituting of steam for benzene in the process of extracting fat from bones; ethyl alcohol for methyl alcohol; white spirit for carbon tetrachloride; and toluene for benzene in the process of softening plastic tubes.

Using the safest material for the task in hand and using it in the safest manner practicable is on a par with using the safest machine or piece of plant for a particular industrial process or operation.

The complexity of modern substances and their processing necessarily means that safety cannot be achieved always by the basic steps outlined and there remain residual dangers, perhaps considerable, which demand to be curbed. Curiously, although new hazards, including those of radiation, are constantly developing, precautions do not change much in essence. New hazards need familiar precautions usually, sometimes in more extreme degree where the risk is greatest, but rarely are completely new safeguards needed.

Containing the hazard

When highly toxic materials have to be processed, a way has to be found to keep them apart from personnel. Wherever it is practicable it is preferable to box up the material rather than encase the man in protective clothing. The design of completely enclosed systems for hazardous materials, often under vacuum, has advanced with the special requirements of the modern chemical and nuclear industries.

Automatic methods of handling in enclosed systems, together with remote control and advanced systems of instrumentation, are no longer unusual. Less elaborate systems based on total enclosure of hazardous materials are often adequate and in the long run at least economic. (It is often forgotten that when safety depends largely on procedures which take time and hence cost money, the ultimate cost is frequently greater than that of plant more expensive in the first place but obviating such time-consuming procedures.)

In many branches of the fine chemical industries the most hazardous points are those where feeding and discharge of material take place. The discharge of solid, gaseous and liquid waste may also present problems, particularly where a possible hazard to the public exists. Maintenance and repair work, especially when it involves breaking into enclosed toxic systems, bear a risk to the health of the men concerned with the particular job and also to that of operators in the area.

In all cases where a severe toxic risk might arise accidentally, either in operational conditions or during maintenance or other work, an emergency procedure needs to be planned beforehand. The consequences of a fire reaching an otherwise apparently impregnable enclosure, for instance, need to be foreseen and plans need to be made accordingly, and made known to all concerned, including new employees.

Many problems are dealt with by setting apart a small section of the premises and enforcing a specially high standard of precautions in that area whilst other areas operate under more normal conditions.

Extracting harmful fumes and dusts

Something less elaborate than complete enclosure may be quite satisfactory. Partial enclosure allied to properly designed mechanical extraction systems can deal adequately with many poisons in various forms.

An unfortunate fact about the use of exhaust appliances is that many people do not know enough about systems of control of airborne poisons. The effluent of one building has been known to be drawn into the inlet fans of another one; two exhaust systems in one laboratory have been seen which largely cancel

one another out; outlets have discharged in such a way as to feed the incoming air currents to a nearby window. Ventilating engineering is a specialised job and it should be left to experts even in cases where only a modest system is needed.

Excessive faith in the number of alleged air changes as a measure of the adequacy of a ventilating system is still encountered. Rooms full of plant, machinery, materials and other obstructions are not emptied of air like a tank is drained of water. A wider knowledge of maximum allowable concentrations of toxic substances in air would be of value, as would more frequent testing of these m.a.c.'s by persons trained in industrial hygiene.

Numerous examples of excessive concentrations have been known and one is worth quoting. In this case the factory was engaged in the manufacture of photographic film. The atmospheric concentration of methylene dichloride was more than four times the m.a.c. at the production lines and five men were affected by gastric disturbance, drowsiness, headache and irritation of the eyes and nose; and one of the men had a short attack of unconsciousness.

Acting unsafely

The hard facts of industrial life are that in practice a great deal of the safety protection of personnel must rest upon the pattern of methods and procedures. These may be planned well or ill. Investigations, which in the nature of the case usually take place after and not before a mishap, reveal the kind of defects under the heading of planning.

In the absence of strict supervision, disobedience to a well-planned scheme may arise and result in damage to health. Payment on an incentive basis also encourages men to take a short cut and hence avoid the tedium of the longer but safer method laid down. An urge which is natural, even if deplorable sometimes, is to find an easy way to do a job, even if the financial reward does not accrue to the worker directly.

A simple case arose in a dyeworks where a man was employed to pour into the drain a solution of sodium bisulphite in a bowl followed by another bowl of sodium hypochlorite—materials used for removing colour from the hands of dyehouse workers. His instructions were to flush the drain thoroughly after emptying the first bowl, but he failed to do so; he poured away the contents of the two bowls in quick succession without flushing the drain and had to go in hospital for four days.

At another works a rail tanker containing chlorine was being discharged. One of the men attached the discharge coil and opened the valve, but there was an escape of chlorine gas. It was part of the men's training to wear respirators at the " ready " while attaching the coil, and to move away quickly if they noticed an escape of gas. In fact they were not wearing their respirators, but moved away on seeing the escape of chlorine; two men went for respirators and the third man moved forward to try to stop the leak. Not surprisingly, he was affected, having no protection against the chlorine gas.

In both these cases the safety of the men depended upon their own procedures, the carrying out of the work in one way while there was another, easier, way which they preferred. As so often must happen, as men cannot be constantly supervised, the wrong procedure was followed. They illustrate the fact that reliance upon procedures for safety affords the lowest standard of safety. The second case demonstrates also the allied weakness of protecting a man from poison by putting the control (a respirator in this case) on the man instead of applying control directly to the source of poison (hardly practicable in this particular case).

An unfortunate feature in this field of safety is that a small error can lead to a hazard out of proportion. When a checker in a soap factory forgot to operate a valve a tank being filled with ammonia overflowed, and he was gassed even though he donned an ammonia respirator. In the hurry he may not have adjusted the respirator properly, but the prime fault was in failing to turn a valve.

Operating the wrong valve is, unfortunately, not uncommon, but it is all too often facilitated by designers who, perhaps in a search for symmetry and pattern, make controls too much alike. Better design and location and the use of interlocking controls to ensure sequential operation, could be developed further.

The complete list of safety precautions depend upon all the relevant factors and not merely on the material handled. The use of suitable protective clothing, the provision of high-grade bath and washing accommodation, and the checking of the effectiveness of precautions by periodical medical examinations, are all common precautions where health risks are met. For the really untamable operations, fortunately relatively few in number, a restriction on the hours of exposure to the substance may even be necessary.

What is always needed is a careful and balanced appraisal of the risk and its minimising by all practicable means and primarily by fundamental precautions like the substitution of safer material; the planning of operating procedures and maintenance work; an awareness of the effects of changes made whether chemical, technical or on a work study basis; and a plan to deal with foreseeable emergencies, even if they are not likely to be large ones. This plan and the other safeguards, particularly those based on safe procedures, need to be impressed upon all employees and repeated from time to time. Training and supervising in the interests of health and safety are unspectacular chores; but when they fail to be carried out the results may be both dramatic and unwelcome.

FIRE APPLIANCE MAINTENANCE AND RENTAL

Section 12, (1), of the new Factories Act, which came into force on December 1, 1960, states " In every factory there shall be provided and maintained appropriate means for fighting fire which shall be so placed as to be readily available for use." In this respect the Pyrene Co. Ltd. provide a maintenance or rental-maintenance plan.

The maintenance plan covers the initial testing of all existing extinguishers and the carrying out of any service necessary to ensure efficient operation. Periodic inspection takes place and certificates are issued to state that the equipment is in good fire fighting condition. Extinguishers are refilled, and worn or unserviceable parts are replaced.

Under the rental-maintenance plan, a free and impartial survey is made of premises entirely without obligation. Detailed recommendations are then submitted as to the numbers and types of extinguishers required in accordance with the requirements of the Factories Act. If this is accepted then the equipment is periodically serviced according to the maintenance plan, and the staff are instructed in its operation.

A New Scheme for Teaching Factory First Aid

In the factories of Britain there is a serious lack of people trained in first aid. The Ministry of Labour has taken action to bring first aid boxes into line with modern needs. The next step is to modernise training in industrial first aid. A new scheme of first aid teaching has been evolved by the Harlow Industrial Health Service and it is described in a new book reviewed below.

FACTORIES are inevitably dangerous places. Moving machinery, sharp cutting edges, white-hot metal, chemicals and fumes, and high electrical potentials are essential parts of modern industry. No matter how good the precautions, accidents are bound to happen. So every factory must have one or more people with a knowledge of practical first aid.

First aid is still the Cinderella of the health services. Until recently the equipment provided for first aid in factories under the law contained items long discarded by doctors and hospitals as obsolete and even dangerous. Teaching, though admirable in its enthusiasm and its general principles, has been out of touch with what actually happens on the factory floor.

Official Ministry of Labour investigations at Halifax and Stoke-on-Trent have shown that first aid arrangements in many, if not most, factories are grossly inadequate, and new regulations, bringing factory first aid equipment up-to-date, came into force at the beginning of 1960. There remains the problem of *what the first-aider* in the factory or other work-place *ought to know* if he or she is to be able to do the necessary work with modern medical standards of efficiency.

This gap in the chain of efficient industrial first aid is closed by the publication of *First Aid in the Factory*, by Lord Taylor and his medical colleagues of the Harlow Industrial Health Service. It is a modern practical handbook for industrial first aid workers everywhere (Longmans, Green and Co. Ltd. for the *Medical World*, price 9s. 6d.).

Survey of needs

Five years ago Lord Taylor and his colleagues began an investigation of first aid in industry. They were providing a group medical service for a number of factories ranging in size from those employing 1,000 or more workers down to small firms employing ten people or less. As a part of this service first-aiders had to be trained and first aid boxes supplied and stocked.

"We were shocked at some of the things which the law compelled us to put in these boxes," they write; "so we set out to discover what first-aiders in industry really have to do. We started with a work-study or job analysis."

Existing first aid teaching, admirable though it may be for major accidents in civil life, bore little relation to the industrial first-aiders' actual needs. So they worked out a new scheme of teaching, based on modern medical principles, and directly related to the situations which face the first aider in the factory, shop or office, on the building site or the farm.

Nature of industrial first aid

The essence of first aid in the factory or other work-place is not the occasional major accident (though the first-aider must know what to do when this occurs) but a stream of minor injuries and minor ailments, small cuts and burns, colds and headaches. Many of these the first-aider will have to treat himself, and they will never be seen by a trained nurse or doctor. In so doing, he is stepping beyond conventional first aid. At first sight this may seem wrong to the trained nurse or doctor. But in the home the mother treats small cuts and headaches. If she did not do so the health services would break under the strain. There are close on a quarter of a million factories in Britain, so a nurse or doctor for each little cut at work is manifestly absurd. As a result, in industry the first-aider comes into his own.

In undertaking full treatment of minor injuries and ailments the first aider is shouldering a serious responsibility. He must know his job, and his own limitations, and when to call for help. Given the right teaching, this is easier than ever before. The old fashioned first-aider who worked by rote is fast being replaced by the white-coated industrial technician, familiar with the essentials of physics, chemistry and biology. So teaching must be precise and scientific; vague talk by the first aid teacher about germs and antiseptics will be quickly detected and exposed.

It is in the light of these considerations that Lord Taylor and his colleagues have built up their teaching. All treatments are carefully reasoned and have been found effective in practice. Obsolete teaching is ruthlessly discarded. And elementary anatomy and physiology, which has no practical importance, gives place to detailed discussion of the real hazards of industry.

Treatment of common injuries

Wound cleaning is the first essential of efficient first aid. The practice advocated here is based on the knowledge that even the smallest industrial cut is usually through skin coated in oil. Adhesive plasters will not stick to oily skin. So the removal of oil is the first necessity. Once the dressing is applied, it must be protected from oil. An oil-soaked dressing may help to produce industrial dermatitis.

In the control of bleeding the use of the tourniquet and the hunt for pressure points are abandoned. The technique of direct pressure to the bleeding wound is clearly explained and illustrated.

In the past ten years our knowledge of shock and its treatment has undergone a revolution, largely as a result of research at the Birmingham Accident Hospital. The myths about shock are exploded and rational treatment on modern lines is set out.

The care of fractures is brought up to date and clear illustrations enable the first-aider to recognise the common types of fracture. Rarities, which are seen by doctors once in a life-time, are purposely omitted, so that the first-aider will not be confused with information he is never likely to need. The danger of over-enthusiastic first aid is that it will make the injury worse; wherever this danger exists, for

example in the care of the fractured spine, it is strikingly brought out. Illustrations show the right and wrong ways of lifting and carrying, so as to avoid back sprains and slipped discs.

Injuries due to burns, chemicals, fumes, excessive heat and electricity are fully dealt with, and there is a special section on injuries to the eye. About one in ten of all industrial injuries involve the eye, yet first aid teaching on this subject is usually unrelated to the risks of industry. The limitations of first aid in the removal of foreign bodies from the eye are explained, and the special dangers arising from the use of certain tools, especially the mushroom-headed chisel, are emphasised.

The sick or unconscious patient

The care of the unconscious patient is approached in a new way. Here simple first aid measures can often save life. Again, the common causes of unconsciousness are stressed, so that the first-aider may have a clear plan of campaign. Modern methods of rescue from gas and electrical hazards are explained, and artificial respiration is taught and illustrated with simplicity and clarity.

There are special sections on the transport of the injured, on the care of minor ailments, on record keeping, on the contents of first-aid boxes and on the conduct of industrial first aid examinations.

The volume is illustrated by numerous photographs and line drawings, for which actual workers in factories have acted as models.

This is a book for first-aiders themselves, whether they work in factories or on building sites or farms, in shops, offices or warehouses. It is also a book for all who teach industrial first aid, especially doctors and nurses in industry. It converts what has too often been thought of as a dull and dreary subject into an exciting exercise in applied medicine and surgery. Its purpose is to set the highest possible standard for industrial first aid throughout the country, as a contribution to the health and efficiency of all who work in industry.

Stains and reagents, including dyes for scientific purposes, are catalogued in a new price list from George T. Gurr Ltd. Another booklet lists accessories for microscopy and biological science.

Chemicals in the Commons

Drug Prices: Questions About ABPI Scheme

By Our Westminster Correspondent

A STATEMENT on the renewal of the voluntary scheme for the regulation of drug prices was made in the Commons last month by the Minister of Health, Mr. Enoch Powell. He said that agreement had been reached with the Association of British Pharmaceutical Industry on a number of modifications to the scheme and it was to be renewed, as modified, until June 30, 1964. He announced the main modifications. (These are given in our Topics and Comments note.)

Mr. Kenneth Robinson (Labour, St. Pancras, N) asked the Minister in how many cases the price would be directly negotiated and what provision there was for the list to be expanded; whether the export price criterion remained the average export price; and whether the definition of new drugs lay within the Minister's control.

Mr. Powell replied that negotiations would be opened at once on the prices of a few widely-used drugs which together accounted for nearly half the value of those satisfying the export price criterion. Other drugs in large demand by the N.H.S. would be considered from time to time. The export price criterion remained the weighted average export price. New drugs in this context were defined in the scheme.

The savings which would result from the scheme could not yet be estimated.

Import of drugs

Mr. Marcus Lipton (Labour, Brixton) asked if hospitals bought drugs from the Continent and what savings were made in this way. Mr. Powell said hospital purchases of foreign drugs were very small.

Extravagant prescribing . . .

A Conservative M.P., Sir Godfrey Nicholson (Farnham), asked if the Minister was taking steps to see that new doctors were warned against inflating costs by unnecessarily prescribing expensive drugs. Mr. Powell replied that in teaching establishments attention was given to this.

. . . and advertising

Dr. Edith Summerskill (Labour, Warrington), asked about the expensive promotion methods of certain drug houses supplying the N.H.S. What action was proposed to curtail this? she enquired.

Replied Mr. Powell: "The industry has adopted a code of practice designed to eliminate improper forms of sales promotion. I shall continue to bring any breaches to their attention forthwith."

Dr. Summerskill then said that 70% of the cost of some American drugs could be related to advertising purposes. The country was paying £70 million for drugs and a great part of that amount could be related to undue advertising.

Mr. Powell said that Dr. Summerskill was exaggerating advertising costs.

Deceptive pots

In the Lords Viscount Alexander of Hillsborough, Leader of the Opposition, showed fellow peers a fancy pot of skin food as an example of how he believed housewives were being deceived.

He was supporting an amendment to ban deceptive containers moved during the committee stage debate on the new Weights and Measures Bill.

Lord Alexander said the pot had "a false bottom" and contained little more than half the quantity anyone would assume it to have.

Lord Mancroft pointed out that there were many containers, particularly in the pharmaceutical world, which had to be a good deal bigger than their contents.

Lord Hawke wondered why women were prepared to pay enormous prices for what he believed was "little more than scented mutton fat."

Lord Stonham referred to detergents and said that a manufacturer who sold ½ lb. in a package 2 in. bigger than his competitor's was attempting to deceive the housewife.

Lord St. Oswald, for the Government, said that although the Bill did not cover cosmetics, the schedules enabled them to be marked by weight by order. When he gave an undertaking to see whether something further could be done the amendment was withdrawn. (See note on page 3.)

American Commentary

NEWS AND VIEWS OF THE U.S. PHARMACEUTICAL INDUSTRY

by Rolf Silken

Import of high-quality drugs at great savings—even by Government agencies ★ Drug counterfeiters being hunted ★ Red No. 1 and the new Colour Additives Law—a situation not as confusing as it looks.

AMERICAN drug manufacturers are worried because even the navy, army and air force—through the Military Medical Supply Agency and the Veterans Administration with its 170 hospitals—are buying drugs in increasing amounts from European suppliers. Large orders were recently placed, for instance, in Italy (antibiotics—which the army is now stockpiling) and Denmark (tranquillisers—at 75% savings). Naturally, quality and labelling of the incoming products, like those of American manufacturers, must pass Food and Drug Administration inspection. Among the drugs recently purchased abroad, at savings of millions of dollars, are tetracycline, meprobamate and nitrofurantoin.

Americans complain that tax-supported Government agencies are spending tax revenue from American industry to support foreign "cut-rate" competitors; and they emphasise that patent laws of many European countries differ greatly from those of the U.S.A., making it possible for foreign competitors to utilise royalty-free processes and treatments developed in this country. These so-called "pirating competitors" not only do not worry about licences, but their expenses for wages and overheads are much lower and raw materials and equipment often cost them much less.

Yet it is very questionable whether the American industry will be able to persuade the Government from importing drugs at cheaper prices. The influential Senator Kefauver and Congress are not supporting this request as long as American bidders do not cut prices sufficiently to meet quotations from abroad for drugs plus shipping costs and import duties. In fact, the U.S. Comptroller-General has already ruled that Government agencies cannot be required to turn down a favourable bid from a foreign supplier.

Drug frauds

Passed off as the product of the legitimate manufacturer, an increasing number of counterfeit drugs are being marketed by fly-by-night outfits. They are mostly poor imitations, except for looks, are often low in active ingredients and, therefore, a serious threat to the public health. The F.D.A. has started a vigorous drive to expose and stop these counterfeiters.

Colour conundrums

FD&C Red No. 1 (FD&C stands for Food, Drug, and Cosmetics) is a widely used, water-soluble coal-tar colour. In 1959 the FDA certified close to 126,000 lb. of this "reddest of the reds"—all other certified reds have a bluish tint. Now its use in any food, drug or cosmetic preparation has been forbidden. These products—*e.g.* sausage casings, fruit preserves or mouth washes—become adulterated if Red No. 1 is added to them in future, but old stocks of finished goods may still be sold.

Animal tests

Reason: Many rats, mice and dogs fed by the F.D.A. over long periods (up to 18 months) with large amounts of the colour (up to 5%) suffered liver damage; and it is possible that further tests may prove it carcinogenic. But it can take up to seven years to make it necessary to invoke the Delaney Amendment. Until then, the possibility exists that a tolerance can be established by interested manufacturers who would have to prove at what levels Red No. 1 can safely be used.

Toxicity suspected

A confusing situation? Maybe this explanation will clarify it: As yet no scientific evidence exists that Red No. 1 is an acute toxic substance. However, the new Colour Additives Law permits the F.D.A. to act swiftly whenever and wherever toxic effects are suspected. That's the case with Red No. 1—even though only a few weeks ago this very colour was included in an F.D.A. list of colours considered not harmful as an additive.

Other formerly certified colours now "delisted" are these FD&C products: Red No. 32; Oranges Nos. 1 and 2; Yellows Nos. 1, 3, and 4 (the latter more recently designated as External Yellows No. 9 and 10). They all were found to be toxic and unsafe for unrestricted use. But it is permissible to use them in externally applied drugs and cosmetics and, temporarily, in dentifrices, mouth washes and drugs for internal administration. This temporary permission is based on the fact that these colours are not carcinogenic and are still considered safe at certain levels.

SCENT OF FLOWERS AND LEAVES

(*Continued from page* 10)

gardens, but in Southern England we may occasionally come across our two native species, namely the Large and Small Hell-weeds or Strangle-tares, which have small faintly pink or dirty brown waxen blossoms which have a pungent earthy and stale wine odour. But it is significant that several species indigenous to Peru, for example *C. odorata*, have a similar extremely sweet, non-iononic, violet-like odour such as is observed among some of the truffles.

Conclusion and summary

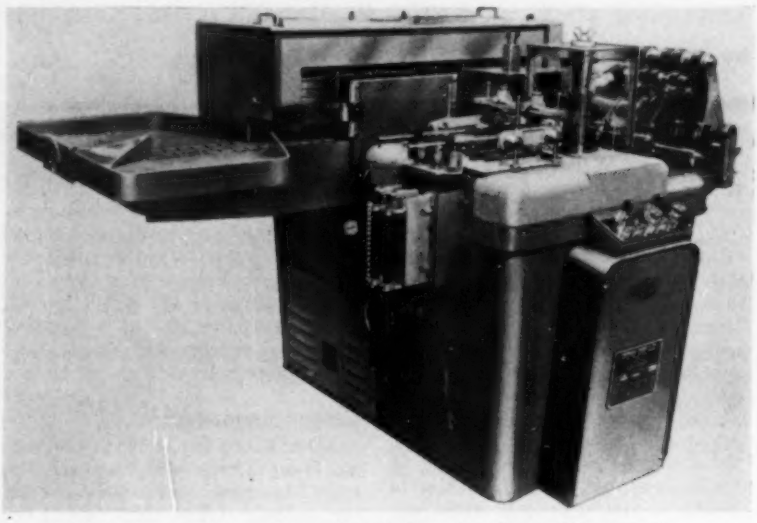
About the remaining miscellaneous genera there is little extant. However, there is sufficient evidence in *La Flora Argentina* by Luis E. Grimaud (Buenos Aires, 1932) to suggest that among the *Jaquemontias*, *Maripas*, *Merremais* and *Operclunias*, and similar types of woody vines, the blossoms of these *Belles de Noche* can offer something unique in exotic fragrances. A liaison between some of the redolences described in this Order should offer the perfumer some interesting permutations upon the "almond" theme, especially in conjunction with cyclamen and cuminic aldehydes.

▶HIGH SPEED LABELLER

A machine which will apply labels 6 in. ×8 in. to round containers and which will apply wrap-round or back and front labels at 120 bottles per min. has been introduced by Morgan Fairest. Known as the *BLM 2A* labeller, it is a compact machine incorporating its own motor drive and vacuum circuit in a fabricated steel body.

A "No-bottle-no-label" device, mechanical overload and an infinitely variable speed device are fitted, together with many other features. An automatic dating device can be fitted if required to apply, in ink, the date or code to the plain side of the label. Bottles pass straight through the *BLM 2A* at a continuous uninterrupted speed whilst in a vertical position.

The labeller can be operated by semi-skilled labour and changed over for different bottles or labels in a matter of minutes, all change parts being dog or dowel located.



This new machine can apply labels to bottles at 120 per min.

▶HIGH TEMPERATURE OVEN

To meet the special requirements for a high temperature laboratory size oven, Isopad Ltd. have designed and constructed a new oven. The inner stainless steel casing measures 40 cm. × 40 cm. × 30 cm. (approximately 15¾ in. × 15¾ in. × 11¾ in.) and is backed by 3 in. of thermal lagging; the outer casing is stove enamelled mild steel.

Three stainless steel trays are fitted and the oven temperature is automatically controlled by a mercury-in-steel contact thermometer calibrated 0–800°C. The thermal efficiency is high and a loading of 1,800 W is sufficient for the operating temperature of up to 500°C. (930°F.)

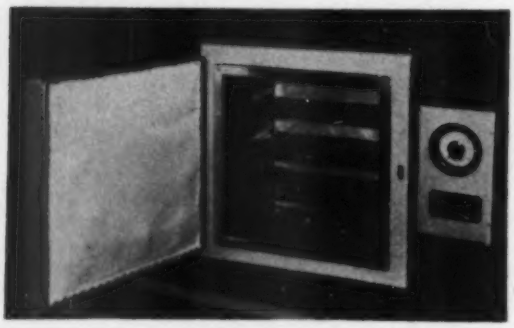
Ovens of this nature are also made in larger dimensions as well as in the special design suitable for use in flameproof areas Group II and III; in that case, the heating elements are metal sheathed and mineral insulated; and they terminate in flameproof glands and flameproof terminal boxes. The element temperature must of course, be kept below the spontaneous ignition temperature of explosive gases or liquids present, for which purpose a range of controls in flameproof housings or automatic intrinsically safe controls are available.

▶DRUM HEATER

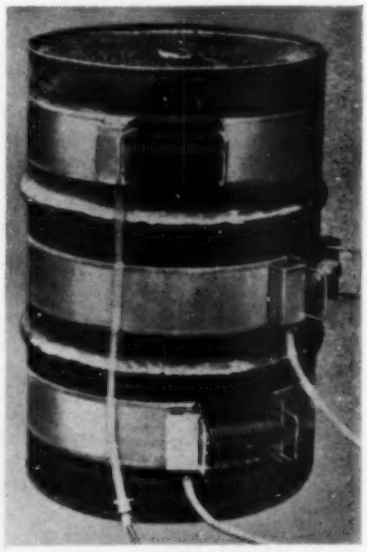
A new drum heater has been designed by Electro-thermal Engineering Ltd. to provide speedy application of heat to drums containing viscous or solidified materials such as grease, tar, wax, asphalt, bitumen, paint, gelatine, etc. It can also be used for drying after washing.

By using single or multiple heaters it is possible to apply heat to any, or all, sections of the drum. This eliminates wasted heat when only a portion of the drum requires heating. The amount of heat can be regulated by single or multiple control units.

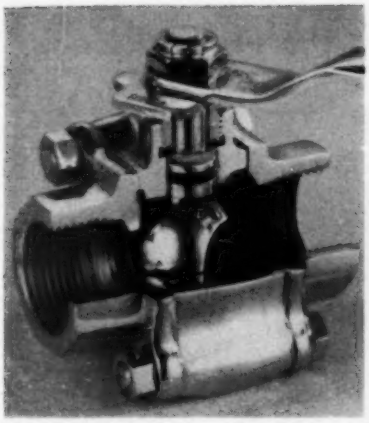
The heaters weigh only 9 lb. and they can easily be stored.



Stainless steel oven with mercury-in-steel contact thermometer made for Union Chimique Belge.



Drum heater designed to apply heat to any or all sections of a drum.



The Worcester ball valve which acts as both a valve and a union.

▶TEMPERATURE INDICATOR-CONTROLLER

A new electronic temperature indicator-controller is now available in the Fielden *Bikini* range of instruments.

It is housed in a 6 in. diameter panel-mounting case and has a 13 in. scale calibrated in °C. or °F. (in any of 73 standard ranges for temperatures between −200°C. and +850°C.) The control point is set by a pointer operated from the knob in the centre of the dial, whilst the indicating pointer is motor-driven from a servo-system.

The instrument is completely transistorised, and it can be operated from 12 volts d.c. or the usual mains supply.

The flush-mounting meter-type case takes up a minimum of panel space.

The platinum resistance measuring bulb used with the indicator-controller is housed in a robust stainless steel sheath of ¼ in. diameter and it is claimed can be located at any distance up to 300 ft. away from the instrument. The control relay, which has contacts rated at 10 A. to provide both changeover and " normally open " switching, can be located up to 300 ft. or more distant from the instrument if required.

All interconnections are by electric cabling having no effect on the performance or calibration of the instrument which provides an instantaneous response between measuring point and instrument, and instrument and control relay.

The makers claim a calibration accuracy of ±0·5% of the scale and a repeatability of 0·25°C. on most ranges. Its price compares with mercury-in-steel, galvanometer and thermo-couple instruments.

Large-scale production has already commenced and many of the 73 ranges are available with prompt delivery. The manufacturers are Fielden Electronics Ltd., Wythenshawe, Manchester, from whom Spec. Sheet BIK.2/(M.C.) may be obtained.

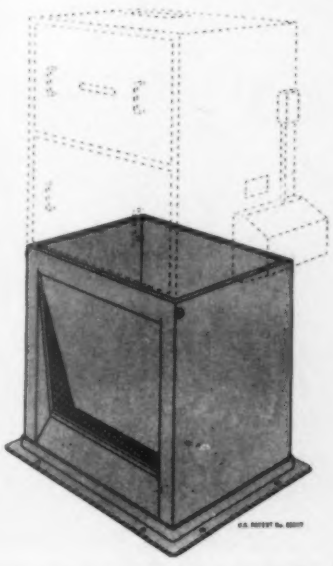
▶NEW DESIGN BALL VALVE

A new ball valve has been introduced in this country by the Worcester Valve Co. Ltd., Burgess Hill, Sussex. Known as the *Worcester* ball valve, it is available in sizes from ¼ in. to 2 in.

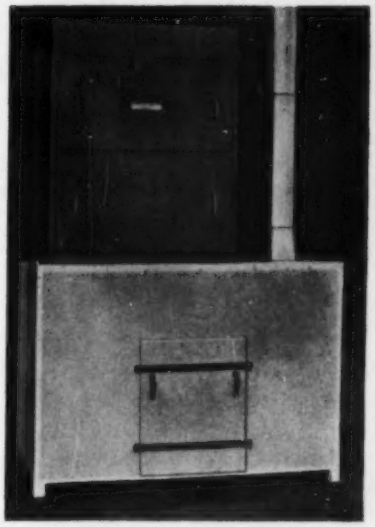
This ball valve is well known in the United States as the Econ-O-Miser and it has been marketed there for many years by the Worcester Valve Co.

The valve is available in bronze, carbon steel and stainless steel and with a wide range of seating materials. One of its features is that it acts both as a valve and as a union. With today's variety of seat materials —buna-N nylon or P.T.F.E.—this valve can perform many of the functions of gate, flanged gate, diaphragm and lubricated plug valves.

Maintenance is comparatively simple, the makers claim, as the valve is designed with detachable pipe ends which replace companion flanges.



Dust control unit with sack tipping attachment for emptying sacks containing dusty materials by tipping into floor orifice.



Dust control unit mounted on storage container.

By removing four nuts and bolts, the entire centre section lifts out. Seats and O-rings can be replaced quickly and the valve returned to the line.

▶DUST CONTROL UNITS

Normally a 4 cu. ft. dust container is the maximum convenient size for manual handling. Bulky or granular materials demand special consideration in the case of unit dust collectors and to deal with problems of this nature the Dallow Lambert *Unimaster H* type model is available.

This is a conventional dust control unit in the new *Unimaster* range, fitted with an angle flange at the base of the filter chamber. This adaptation allows the unit to be mounted on large storage containers which can be made up from any material such as timber, chip board, sheet metal, etc., always providing they are airtight. Adaptations of this type have many applications in industry. One is the emptying of sacks containing dusty materials by tipping into a floor orifice. For this application the unit is available with a patent sack tipping attachment and the dust is satisfactorily controlled and conserved.

This unit can also be fitted on top of hoppers with rotary valves for tailing the collected dust back into conveying systems.

The units are available in 70, 100, 150 and 250 series (70-250 sq. ft. of filter area) with fan capacities up to 2,000 c.f.m.

Tests for " pernicious contraries "

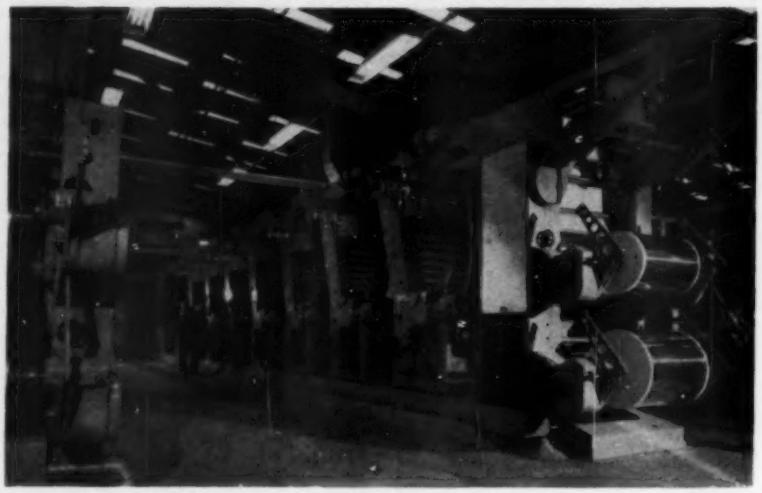
Resins, waxes and other substances used in paper and board are known to waste paper merchants as " pernicious contraries " because they can make the paper and board unsuitable for repulping. To encourage the segregation of waste paper treated in this way, a booklet has been issued which describes ten practical tests for contraries. The British Waste Paper Utilisation Council, which issues the booklet, says that none of the tests needs special skill or laboratory equipment—and they are explained in simple terms. The following is an example.

Soak a piece of paper in water and rub it between thumb and forefinger. If it feels leathery and does not rub up easily it is probably wet-strengthened, or perhaps tubsized. Now place laminated paper or carton board against a hot iron or steampipe, pull it apart and watch the action of heat on the inner surface. A sticky or stringy effect suggests that the laminating agent is a paraffin wax adhesive.

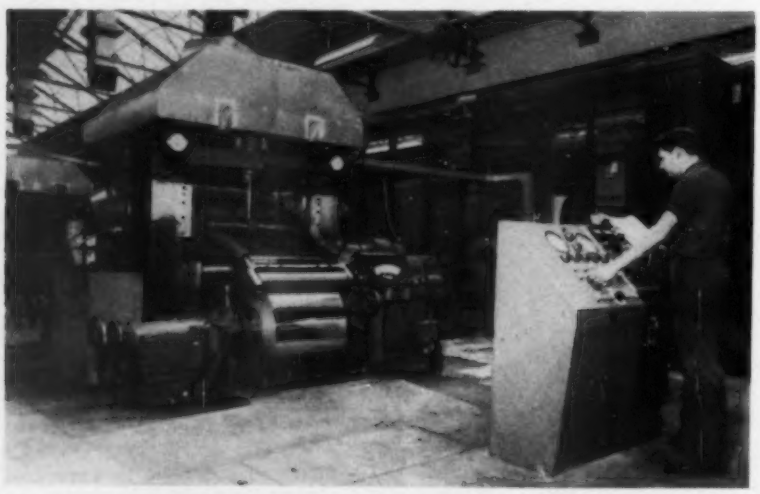
Equally simple is the identification of coatings and adhesives which make waste paper unsuitable for repulping. A 1% solution of caustic soda is heated near to boiling in an enamel basin (never aluminium) and paper is dipped into it for about a minute. If the coating or adhesive dissolves and the material breaks into pieces it can probably be repulped by usual processes. Signs of melting or stringiness, however, may mean that it is not suitable.

The only mechanical equipment needed for any procedure described in the booklet is a standard disintegration vessel with a propeller running at 3,000 r.p.m. For the rest the apparatus consists of a few bottles or beakers and—in the Jayme and Branscheid colour test—a number of 6 in. glass rods.

The new booklet deals only with known practical tests for contraries in waste paper, although the British Waste Paper Utilisation Council research programme includes the study of new rapid physical methods. Free copies and information can be obtained from the Council's Secretary at 52 Mount Street, London, W.1.



One of the two new rotogravure machines, capable of printing aluminium foil laminates in up to seven colours, now installed at the Silvertown factory of Venesta Foils Ltd.



Two new rolling mills at Venesta Foils Ltd. factory in East London have increased the company's light gauge aluminium foil output by nearly half. Both are four-high and designed to roll foil up to 30 in. in width; they are fitted with isotopic thickness gauges and control equipment of the latest type to ensure accuracy in rolling.

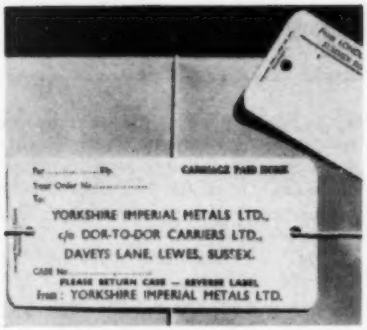
Venesta's new foil printing machines

Two seven-colour Thrissell gravure printing machines have just been installed at Venesta Foils' Silvertown factory. Since 1956 nearly £1 million has been invested in new plant for foil rolling, processing and research in the company's factories in London and Glasgow. More than £600,000 has been spent on new rolling mills and ancillary equipment in the last two years alone. The new gravure machines, which cost over £100,000, are designed to print either side of foil/paper or foil/plastics film laminates. Unsupported paper or plastics films can also be handled if required, although Venesta Foils normally print these only if they are to be combined with foil before they leave the factory. Unsupported foil cannot normally be printed on the machines.

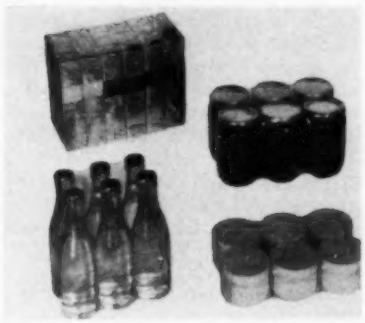
The range of materials expected to be handled by the machines extends from 0·009 mm. foil backed with 9½ lb. tissue to 0·014 in. boxboard.

Course for buyers

In co-operation with the Institute of Packaging, the Purchasing Officers Association are running a course for buyers of packaging at the Connaught Rooms, London, W.C.2, on Tuesday and Wednesday, February 14 and 15. One of the papers will be " Choosing



Printed and plain labels made from a thin gauge white PVC sheeting by Iridon Ltd.



The use of Shrinkwrap for overwrapping a number of articles has been developed by E. S. and A. Robinson Ltd.—a selection of some of the suggested uses is shown.

the Pack," by A. Fraser Much, packaging adviser, I.C.I.

Other papers will deal with the buying of packages in plastics, glass, paper and board, metal and wood.

The course fee will be £10 10s. and reservations should be sent to the Purchasing Officers Association, Wardrobe Court, 146A, Queen Victoria Street, London, E.C.4.

Plastic coated glass aerosols

An advance has been made in the field of plastic coated glass aerosols by Rockware Glass Ltd. A new fully automatic machine is being installed at their Greenford factory and this will be fully operational by early February, producing over 10,000 units a week.

To cater for users requiring standard packs Rockware are making available four stock designs, in six standard colours, and this means that a product can be marketed in a *Rockaer* bottle at a very economic cost. The attractive feature is that glass is not corroded and the plastic coating acts as protection if the pack fails. This is particularly important in the packaging of pharmaceutical products such as inhalants.

P.V.C. Labels

A thin gauge, white PVC sheeting is now being used for label manufacture, both plain and printed. Additional matter can be written on the labels in ink, pencil or Biro. Since PVC is tough and resistant to chemicals and atmospherics, identification tags, shipping and address labels made from this material are durable and, because of the matt white surface of the material, easily legible. The PVC used for the manufacture of these labels is supplied by Iridon Ltd.

Gordon and Gotch buy Bubblepak

Gordon and Gotch Ltd. has bought the business of Transparent Plastic Containers Ltd., manufacturers of Bubblepak. The company is now registered as Gordonia Packaging Ltd. Its manager is Mr. R. A. Hardiman.

The sole agency for Bubblepak was granted to Gordon and Gotch three years ago.

Transparent and plastic overwraps

The use of *Shrinkwrap* for overwrapping a number of items has been developed by E. S. and A. Robinson Ltd., Bristol.

Shrinkwrap is produced by Robinsons by cross-tensilising and reorientating the molecules of Goodyear *Pliofilm*. It forms a heat-sealable, transparent film which can be shrunk by the application of moderate heat to form a "skin-tight" glossy overwrap on almost any shaped article. The effect of applying heat—generally between 190°-200°F.—is to return the molecules to their former state, so causing a shrinkage of up to 50% in the area of the film.

Coty (England) Ltd. have recently introduced American-made Super-Sheen nail enamel to match all shades of Coty 24 lipstick. The containers and closures for this new enamel are made by United Glass Ltd.

A small machine to produce plastic coated glass aerosol bottles has been installed at the Greenford works of Rockware Glass Ltd. and W. A. Bailey, Sons and Co. Ltd. This machine is the forerunner of a fully automatic machine which is being installed next February. The new machine will be able to produce over 100,000 units a week. Picture shows an operative examining a freshly coated bottle and feeding uncoated glass bottles on to the conveyor system.

Chemistry and Chemical Engineering

By A. J. Bune. The Sunday Times. 1960. *Pp.* 104. 3*s.* 6*d. net.*

THE *Sunday Times* has undertaken the worthy task of compiling career books for school leavers. In previous years such booklets were prepared by the Ministry of Labour, and one remembers that they withheld more information than they revealed. A young boy or girl at the age of sixteen wants to find out not only the career prospects of a certain profession but also the financial prospects.

The field covered by chemistry and chemical engineering is so wide that many generalities have been made in this book which are quite inaccurate upon closer acquaintance. The earlier chapters define the scope of chemistry, ranging all the way from the origin of synthetic dyestuffs to the discovery of penicillin and plastics, briefly touching upon the less colourful aspects of routine heavy chemical manufacture. A few pages describe the training which a student must undergo in order to qualify as a chemist or a chemical engineer: either by first graduating at a university and subsequently applying for membership of the Royal Institute of Chemistry or the Institution of Chemical Engineers, or by only taking the examinations of these professional bodies.

A whole chapter is devoted to research in chemistry, describing some activities of the National Chemical Laboratory and various D.S.I.R. establishments; pointing out to the romantic young soul how great inventions like manufacture of polyethylene had humble origins firmly set in the research laboratory. Various branches of the chemical and nuclear industry such as petroleum, fine chemicals, plastics and fibres, food and nuclear science are described in subsequent chapters. Unfortunately information regarding salary prospects in these industries is limited to the Scientific Civil Service (which only employs a minority of chemists and engineers)—it would have been most helpful if some kind of salary scale similar to that recently devised by the A.B.C.M. could have been included. The main criticism that must be levied is that altogether too much information has been presented in too concentrated a form; it would have been more useful to arrange some information in tabulated or graphical form which is better for comparative and reference purposes.

I. L. H.

Unity and Diversity in Biochemistry

By Marcel Florkin. Pergamon Press. 1960. *Pp.* 397. 70*s. net.*

THE mysteries of life are still far from being fully explainable in terms of biochemistry, and most of us are very content that this should be so. Nevertheless, it should clearly be the duty of all chemists and biologists to keep themselves informed of present progress in the understanding of vital processes.

This volume by Prof. Florkin of the University of Liège admirably meets the needs of such readers, and the translation into English by T. Wood has obviously been very well done.

The book is in six parts. Part I deals with organic chemistry in its original sense—the study of substances actually produced in living organisms. The total collective mass of living organisms of earth, air and water (lithosphere, atmosphere and hydrosphere) is referred to by the author as the *biosphere*.

Part II treats of energy reactions, energy-rich phosphate bonds, and enzyme action. Part III is concerned with chemical reactions of the biosphere, both "priming reactions" to produce energy-rich linkages, and syntheses requiring energy. A summary is given of research techniques, including the use of isolated organs, extracts, purified enzymes, radio-isotopes and mutants.

Part IV deals with cell structure and the regulation of cell processes. Part V gives selected examples of biochemical diversity, both within species and among species; and discusses the relation of such diversity to taxonomy, to inheritance, and to "evolution."

Part VI describes the entry of inorganic compounds into the biosphere (via photosynthetic and autotrophic organisms), the mechanism of their ultimate return in inorganic form, and the cycles of carbon, nitrogen, phosphorus and sulphur in nature.

The book is well printed and solidly bound. It has 104 plates and line figures—of which Fig. 93 could be spared without loss. The author covers so many aspects of such a vast and complex field that no doubt specialists will find minor points to criticise. The ordinary reader is more concerned to know whether the book will form a useful storehouse of information for future reference. The answer is "Yes!"

L. D. GALLOWAY.

Titrations in Non-Aqueous Solvents

A. H. Beckett and E. H. Tinley. British Drug Houses Ltd.

THIS small book is invaluable as a guide to both the simple and the more complicated quantitative determinations of acids and bases by titrating in non-aqueous solvents. It starts by briefly covering the theoretical considerations of the subject and defines the Lowry-Brønsted concept of an acid and a base. The various solvent types are discussed as well as scope and limitations of the method.

Two sections are devoted to the titration of basic substances and acidic substances. Besides covering the methods of titrating the various groups, each section also includes information on the apparatus required, the different solvents, indicators, potentiometric titrations, titrants and standards.

Other brief sections deal with miscellaneous applications of this method, differentiating titrations, titration of Lewis acids, high-frequency titrations, applications to synthetic organic chemistry, chelating agents and redox titrations. This is definitely a handy book for the laboratory bench.

Nine rules for labelling medicines

A.B.P.I., P.A.G.B. and Public Analysts give guidance

Guidance on labels and titles for compound medicinal preparations has been issued by the Association of British Pharmaceutical Industry, the Proprietary Association of Great Britain and the Association of Public Analysts, who have jointly published a memorandum.

Representatives of these Associations have met from time to time to discuss the labelling of medicines with particular reference to Section 6 of the Food and Drugs Act 1955 and, as a result, it was agreed that it would be helpful to publish a document setting out the views of the three Associations on this subject.

It has also been agreed that joint consultation shall continue and that the three Associations will co-operate with each other in resolving any difficulties which their respective members may encounter in the interpretation and application of the document. The ABPI and the PAGB are recommending their members to apply the principles set out in the Memorandum when devising titles and labels for new preparations.

Here are the nine recommendations:

1 Where reference is made in the main title of a preparation to any substance added to improve presentation or palatabili y, the name of the substance should be qualified by some word such as " flavoured," " coated," " coloured," etc.

2 Where the name of an ingredient is included in the title without qualification, the quantity in a recommended dose should bear a reasonable relationship to a therapeutic dose; when evaluating the dose of any substance included in a compounded preparation it is accepted pharmaceutical practice to take into consideration the general character of the preparation and the synergistic action or therapeutic effect exerted by other ingredients.

3 Where reference is made in the title to any ingredients possessing therapeutic activity, this reference should be qualified by some word such as " compound " if the ingredients mentioned are not those which exert the most important therapeutic effect or if the title does not incorporate the names of all therapeutically active substances contained in the preparation.

4 Where reference is made in the title to any ailment or symptom of ill health, either directly or by implication through reference to any part of the body, the preparation should contain adequate amounts of ingredients which are recognised, or can be shown to be suitable, for the treatment of that condition.

5 Where the title incorporates a generic description, *e.g.* linctus, cream, lotion, etc., the character of the preparation should comply with the generally accepted definition of the class to which reference is made.

6 The title or other descriptive matter on the label should not include the word " cure " unless there is adequate scientific support for its use.

7 Where the title or other descriptive matter on the label refers to, claims, or implies any effect following its use, the efficacy of the preparation should not be exaggerated.

8 Where the title or other descriptive matter on the label implies that it is a herbal remedy, the ingredient, or ingredients, which exert the most important therapeutic effect should be recognised as herbal remedies.

9 In the declaration of formulæ, solids should be expressed in terms of weight and liquids by volume; the method adopted should be stated if this convention is not followed or if there would otherwise be ambiguity.

Colour makers acquired by Johnson Matthey

Cowan Brothers (Stratford) Ltd. have joined the Johnson Matthey group.

The company—which specialises in the production of inorganic colours, pigment dyestuffs and lakes—will continue manufacturing and trading as hitherto and will retain all existing staff. Sir Christopher Cowan is remaining as chairman and managing director, together with the present directors, and the board has been increased by two representatives of Johnson, Matthey and Co. Ltd.

Sulphamic acid plant

Marchon Products Ltd. will construct at their Whitehaven factory a plant to manufacture sulphamic acid (amido sulphonic acid) with a capacity more than sufficient to meet the whole of the United Kingdom's known requirements. The manufacture of ammonium sulphamate is also contemplated. Both these chemicals have applications in flameproofing fabrics and wool, and the latter is also used as a weedkiller.

Westbrook's Belgian lanolin plant

Westbrook Lanolin Co. has established a factory in Verviers, Belgium, under the name of Westbrook Lanolin Company Société Anonyme Belge. The most modern refining techniques developed at Argonaut Works, Bradford, will be employed in the manufacture of Golden lanolins.

The establishment of a lanolin plant within the Common Market will enable the company to continue to supply to its customers lanolin and wool grease products at most competitive prices and to develop further the sales in this important market.

Tablet makers expand

Arthur H. Cox and Co Ltd., pharmaceutical manufacturers and packers to the trade, have altered and extended their premises at Brighton. They have installed a new tablet coating plant which is considered to be one of the largest and most modern in the world.

The company's services include the production and packaging of a wide range of tablets, pastilles, creams, ointments, liquids, suppositories, emulsions and suspensions to order.

Reckitt and Colman buy Westminster Laboratories

The latest take over is the acquisition by Reckitt and Colman Holdings Ltd. for cash of the ordinary capital of Westminster Laboratories Ltd.

Westminster Laboratories was founded in 1931 by its present chairman and managing director, Mr. Simon Brook. Among its first products were *Brooklax* and *Bonomint* and these are sold in 90 markets the world over.

In the late 1940s the policy was adopted to develop only new products of an ethical nature and this led to the formation of research and development departments and the acquisition of new technical staff including Mr. H. A. Ryan, B.SC., F.R.I.C., and Mr. E. W. Godding, M.P.S., who continue to serve as executive directors of the company. Continuity of service has been assured for the staff as a whole.

The first Westminster ethical product, *Senokot*, achieved considerable success and, more recently, *Pripsen*, as the first single-dose treatment of threadworms and roundworms, has been introduced. It is understood that a number of new products are being developed.

The business of Reckitt and Sons (a part of Reckitt and Colman Holdings) was founded in 1840 by Mr. Isaac Reckitt and the first pharmaceutical product, *Dettol* was introduced in 1930. *Disprin*, *Solprin*, *Codis* and *Cafdis* have subsequently been marketed with considerable success.

New methanol plant

The A.P.V. Co. are to supply distillation columns, heat exchangers and other process vessels for new methanol plant to be constructed by Chemico for British Hydrocarbon Chemicals Ltd. at Grangemouth, and which is scheduled to be completed in 1961.

Ilford Ltd. expand at Basildon

At Basildon a further extension is to be added to Ilford Ltd.'s £1¼ million factory.

The single storey extension which will be used for additional storage and warehouse accommodation will cover an area of 120 ft. by 200 ft. and comprises three 40 ft. bays.

New styrene plant

A new 50,000 tons p.a. styrene monomer plant is to be built between Neath and Port Talbot, South Wales, at a cost of more than £3m., by Forth Chemicals Ltd. The new plant will be located next to the site selected by British Hydrocarbon Chemicals Ltd. for its own recently announced expansion plans, near to the Llandarcy refinery of the British Petroleum Co. Ltd. Design and engineering of the new Forth plant will be carried out by Monsanto Chemicals Ltd., and the plant is expected to take approximately two years to come into operation.

Cosmetics agency

As from January 1 Les Parfums de Molyneux have acquired the sole distribution rights of Harriet Hubbard Ayer cosmetics in the U.K. and Northern Ireland. All enquiries and orders should be sent to 63 Grosvenor Street, London, W.1.

Removal of import duty

The Import Duties (General) (No. 11) Order, 1960 (S.I. 1960, No. 1970) has been made by the Treasury on the recommendation of the Board of Trade. The Order, which removes the import duty on certain flake graphite and anhydrous borax, came into operation on November 2.

Lauryl ether sulphates

Since Cyclo Chemicals Ltd. first introduced sodium lauryl ether sulphate to the United Kingdom as *Cycloryl NA*, this material has been widely used in cosmetic, detergent, plastics, metal cleaning, electro-plating and other industries.

Interest is now being shown in other lauryl ether sulphates such as the potassium, ammonium, calcium, magnesium and triethanolamine salts of lauryl alcohols reacted with, on the average, two or three molecules of ethylene oxide, as well as the analogous products based on myristyl alcohol. These are now being offered on a commercial scale by Cyclo Chemicals.

Rentokil Group Ltd.

The 32-year old British Ratin Co. Ltd. is now known as Rentokil Group Ltd., thus developing the use of a name which was acquired in a merger a few years ago.

In recent years the organisation has been referred to as the British Ratin Group, and has embraced some ten different companies. The main operating companies within the new Rentokil Group are Disinfestation Ltd., Rentokil Ltd., Woodworm and Dry Rot Control Ltd. and Wood Preservation Ltd. Another new company in the woodworm field is to be launched in the New Year.

Last year, Insecta Laboratories Ltd., Scientex Ltd. and Agricultural and Industrial Coatings Ltd. joined the Group, and the activities of these companies, together with Fumigation Services Ltd., are now combined with Disinfestation Ltd. Another company Mi-Dox Ltd., will become a division of the Rentokil products company.

Rentokil Group Ltd. employs about 1,000. The joint managing directors are W. H. Westphal and E. M. Buchan.

Sturge's Indian venture

A progress report from John and E. Sturge Ltd. states that a sharp deterioration in trading conditions over the last quarter will probably result in the final 1960 profit being some 5 to 10% below the prospectus anticipation. This has not altered the directors' views as regards the final dividend for the year.

In accordance with the plans for overseas developments forecast in the June prospectus, and following quickly on the recent announcement of the formation of S.p.A. Biacor, with the object of exploiting in partnership, in Italy, the Sturge citiric acid process in the Common Market, the company now discloses its interest in a second overseas joint manufacturing project. In addition to being again vendors of a process, Sturge are interested in this second venture as partners in a newly incorporated Indian company, Sturdia Chemicals Ltd., formed to exploit the Sturge precipitated calcium carbonate process in India. The Bombay firm of Nowrosjee Wadia and Sons (Private) Ltd. and its Indian associates will be the major shareholding group. Nowrosjee Wadia and Sons will also act as managing agents for the new company, a function which they already perform for Bombay Dyeing and Manufacturing Co. Ltd. and National Peroxide Ltd.

The new factory will be sited in the north of India and will manufacture many of the Sturge grades of precipitated calcium carbonate for sale in India and adjoining territories.

The first stage will require capital of just under £250,000 and an initial output of 3,300 tons p.a. is envisaged, with plans for ultimate expansion to three or four times this figure.

Company finance

Savory and Moore Ltd. has more than trebled annual sales turnover, almost doubled profits, and increased assets by £570,000 in the last 10 years. During these years the issued capital has increased by £199,256, while the temporary loan capital has been halved.

Agency appointment

Arising from the recent merger of Société Pechiney and Société Saint-Gobain of France, a new company has been formed called Produits Chimiques Pechiney/Saint-Gobain to act as sole distributors of the chemical and plastics products of the combined concerns. K.W. Chemicals Ltd. of London have been appointed exclusive selling concessionaires in the U.K. and Eire.

£1m. increase in Remploy's output

An increase of nearly £1 million took the sales of Remploy Ltd. for the first time well over the £5 million mark during the year ending March 31, 1960. Remploy is the national organisation for employing the generally disabled.

Production and sales both rose by about 23% over the totals for the previous year—itself the company's best to that date—and enabled the company to make a reduction in the Government's grant by £91,000 compared with 1958-59.

In the annual report it is revealed that these results have been achieved in a year when there has been a small increase in the number of disabled employees. An average of 6,251 were employed during the year and there has been a further increase of 100 since March 31.

The chairman says that discussions have been held with the Ministry of Labour on Remploy's future as the present policy agreement, established in 1956, is due to expire next March.

"We hope that, with continued improvement in our trading, our resources will enable us to make a progressive increase in the number of disabled persons employed," he states.

The present agreement provides for employment of at least 6,000 disabled and an annual revenue grant of £2,500,000, subject to the effects of inflation. The company's excess of expenditure over income last year amounted to £2,720,000, which is equivalent on 1956 values to £2,494,000.

A small number of schizophrenic patients have been taken into Remploy for the first time, following their attendance at a rehabilitation unit. In the past, such patients were generally condemned to spend their lives in institutions.

Owing to the improvement in the treatment of tuberculosis, three factories (Portsmouth, Bermondsey and Bristol) previously reserved for T.B. sufferers have been converted so that they can accept all types of disabled people.

Viscount Amory of Tiverton, formerly Chancellor of the Exchequer, has been appointed by the board of Imperial Chemical Industries Ltd. as a non-executive director.

Blaw Knox Chemical Engineering Co. Ltd. has appointed as Engineering manager, **J. McNicol Bruce** A.M.I.CHEM.E.

H. G. Lazell, chairman and managing director of the Beecham Group Ltd., has become a member of the Export Council for Europe.

Lightnin Mixers Ltd., born of the recent association between Stockdale Engineering Ltd. of Poynton and the Mixing Equipment Co. U.S.A., have appointed **Ian MacLeod,** as technical director. For the last two years he has been technical director of Stockdale Engineering Ltd., and has been largely responsible for the development of the new range of U.K. mixers manufactured by the company.

R. W. Ricketts has joined Reddish Chemical Co. Ltd., detergent specialists, as an executive on the brewing and mineral water side of their activities. He is 29 and has spent four years with the Brewing Industry Research Foundation, Nutfield, where he has been participating in the discovery and development of nylon treatment for the stabilising of bottled beers.

O. Secher has been appointed vice-chairman of Marchon Products Ltd. and Solway Chemicals Ltd. Mr. Secher has been with Marchon Products since its inception in London in 1939. He was an Executive Director of the Cumbria Trading Co., the retail sales organisation of the Marchon Group, from its beginning early in the war. He was appointed to the Marchon board in May 1952 and took over sole responsibility for all sales activities of Marchon and Solway in 1957. Mr. Secher was born and educated in Vienna. In 1946 he married Miss Marjorie Metcalf, who at that time was teaching at the Whitehaven Grammar School. They have three sons.

J. R. Jarratt, manager of the chemical works at Boots' Beeston factory, has been awarded the Lampitt Gold Medal of the Society of Chemical Industry. Mr. Jarratt, who is a native of Nottingham, was educated at Mundella School. He joined Boots as a laboratory assistant in the research department in 1928. For the following 20 years he attended night school, where he first matriculated, then took his inter B.SC., M.SC., and A.R.I.C. examinations. In 1936 he moved from the Island Street works to Beeston, where he was employed in the Potassium

O. Secher

J. R. Jarratt

Permanganate Department. During the war he was night manager of the whole of the Beeston works and was appointed manager on V.E. Day, 1945. A member of the Society of Chemical Industry since the early '30s and secretary of the Nottingham Section since 1947, Mr. Jarratt has been chairman of Boots' supervisors association since 1956. He has also taken an active part encouraging young people to take an interest in chemistry, and, in this connection, he has been a popular lecturer in local youth clubs and schools. He is also a well-known figure in the Methodist Church in Nottingham.

Edward J. Fleetwood, home sales manager (fine chemicals) of Howards of Ilford Ltd., has been presented with a gold watch by the company's chairman (Mr. J. A. E. Howard) to mark his completion of 40 years' service with the company.

Dr. J. R. Furlong has retired from the service of the Pyrethrum Board in Kenya to take over the London office of the African Pyrethrum Technical Information Centre from Dr. T. F. West.

John C. Garrels Jr. of Springfield, Mass., U.S.A., has been appointed deputy managing director of Monsanto Chemicals Ltd., London. He has been an assistant general manager of Monsanto Chemical Company's plastics division since 1956. Born at Detroit, Mich., in 1914, Mr. Garrels graduated from the University of Michigan in 1935 with a B.S. degree in chemical engineering. He came to Monsanto, U.S.A. as a chemical engineer in 1942.

Dr. K. Boheimer, medical controller, has been made a director of the Bayer Products and Winthrop Products Divisions of Winthrop Group Ltd. **G. Teeling-Smith,** commercial controller, has been appointed a director of these divisions also.

Industrial Dyestuffs Ltd. of Manchester (the U.K. associates of the Dyestuffs Divisions of Farbenfabriken Bayer, Farbwerke Hoeschst, and Cassella Farbwerke Mainkur) have appointed **W. R. Moon** as manager of their London office at Finsbury Pavement House, 120 Moorgate, London, E.C.2.

G. U. Hopton has been appointed director of the Gas Council's London research station at the Fulham Laboratories. Aged 53, he gained a first-class honours degree in chemistry from Oxford and the same year joined the Gas Light and Coke Co. From 1950 until this year he was chairman of the board of examiners of the Institution of Chemical Engineers. He has also been vice-president of the Institution.

R. R. Kennan is to join the board of Ferry-Diamond Engineering Co. Ltd. of Southampton. He will still retain his directorships of Mono Pumps Africa (Pty.) Ltd. and Mono Pumps (Australia) Pty. Ltd. and the general sales managership of Mono Pumps Ltd., London.

E. R. Griffiths has been appointed deputy secretary of Monsanto Chemicals Ltd. He joined Monsanto in 1956 as assistant secretary. A solicitor, he had previously been head of the legal section of Leicester County Council.

Clifford Pugh, B.SC., F.R.I.C., has been appointed product research manager of County Laboratories Ltd. following the retirement of Dr. R. H. Marriott. Mr. Pugh joined the Beecham Group in 1954 as head of the research section assigned to work on Macleans toothpaste, and in the following year he became product manager. He occupied this post until October 1959 when he transferred to County Laboratories Ltd. to take charge of research work on dentifrices, shampoos and men's toiletries.

A. Boake Roberts have appointed **J. A. Dean,** M.SC., A.R.I.C., deputy manager of the research and development department. He will have executive responsibility for all sections of the department, including research and chemical engineering. **Dr. B. Dudley Sully,** F.R.I.C., who has been acting chief research chemist, has now been appointed chief research chemist.

C. D. W. Stafford, M.P.S., chairman and managing director of Beecham Research Laboratories Ltd., has relinquished the latter appointment. He has been succeeded as managing director by the assistant managing director, **G. J. Wilkins,** B.SC.

I.C.I. board reorganisation

The Board of I.C.I. have redistributed responsibilities among the executive directors.

By combining research and development and discontinuing economic planning, the number of functions has been reduced from eight to six. The Functional Directors are:

Commercial: Mr. W. D. Scott
Finance: Mr. P. T. Menzies
Overseas:
(A) Western Hemisphere and Africa south of 15°N latitude: Mr. R. C. Todhunter
(B) Europe, excluding U.S.S.R. and Eastern Europe: Dr. A. Caress
(C) Rest of the world: Dr. J. S. Gourlay
Personnel: Mr. C. M. Wright
Research and Development: Dr. J. Ferguson
Technical: Dr. R. Beeching

The manufacturing divisions have been re-grouped, and the number of groups reduced from six to five. The Group Directors are:

Group A (comprising Alkali and General Chemicals Divisions): Dr. J. Ferguson
Group B (comprising Dyestuffs, Paints and Pharmaceuticals Divisions): Mr. G. K. Hampshire
Group C (comprising Fibres, Heavy Organic Chemicals and Plastics Divisions: Mr. C. Paine
Group D (comprising Billingham and Nobel Divisions, Wilton Works and Severnside Works): Mr. R. A. Banks
Group E (comprising Metals Division): Dr. J. Taylor.

OBITUARY

Bernard F. Howard, president of Howards of Ilford Ltd., died recently aged 80. He was made a director of the family firm in 1903 and retired in 1960. He was a member of the Pharmacopœia Commission for 15 years and served as Treasurer of the Royal Institute of Chemistry. His only surviving son, T. W. Howard, is the present chairman of the company.

Sidney Robert Mansfield, until recently chairman and managing director of I.F.F. (Great Britain) Ltd., died on November 23 aged 65. He joined the company on its formation in 1926 as sales manager and was appointed to the board in 1938. He became chairman and managing director in 1959.

He served on the executive committee of the British Aromatic Compound Manufacturers Association, being elected deputy chairman in December 1955. In December 1957 he was elected chairman and served for the maximum period of two years until December 1959.

During the past few years he has not enjoyed good health and he was still very ill after a serious internal operation in November.

Penicillin pioneer is new President of Royal Society

Sir Howard Florey has been elected President of the Royal Society in succession to Sir Cyril Hinshelwood.

Sir Howard Florey was born in Adelaide in 1898. In 1935 he became Professor of Pathology at Oxford University. He has made a number of outstanding contributions to experimental pathology and medical science. He is best known for his work in connection with the isolation and detailed study of penicillin and its development as a successful drug. For this work he shared the Nobel Prize for Medicine in 1945 with Professor E. B. Chain and Sir Alexander Fleming. Since 1945, with his collaborators, he has continued to work on the discovery and properties of new antibiotics and latterly has been investigating the underlying disturbances in certain arterial diseases.

The new Treasurer of the Royal Society is Sir Alexander Fleck, K.B.E., who recently retired as chairman of I.C.I. He was President of the British Association in 1958 and is currently President of the S.C.I.

Sir Patrick Linstead, C.B.E., Rector of the Imperial College of Science and Technology since 1955, has been elected Foreign Secretary of the Royal Society. He was born in 1902. He was deputy director of scientific research in the Ministry of Supply (1942-5) and director of the Chemical Research Laboratory of the D.S.I.R. before returning in 1949 to Imperial College as Professor of Organic Chemistry.

Superphosphate committee

An outer seven committee of the International Superphosphate Manufacturers Association has been formed. The committee, following a decision taken at a meeting in London in June, has two basic objects—co-operation between members and co-operation with the parallel Common Market Committee.

Members are co-operating in two ways. First, there is a wide exchange of information, so that members can assess their own position. Second, members agree to help one another against dumping.

Laboratories' new board

The Industrial and Commercial Finance Corporation Ltd. have acquired an interest in Yarsley Research Laboratories Ltd. and nominated Mr. W. Toft to the board. Mr. W. Flavell and Mr. G. C. Ives have also been appointed directors and the composition of the Board is now as follows:

V. E. Yarsley, D.SC.(TECH.), F.R.I.C., *Chairman and Managing Director.*
C. Webber, PH.D., A.M.I.CHEM.E., *Vice-Chairman.*
W. Flavell, B.SC., A.R.I.C.; G. C. Ives, B.SC., A.R.I.C.; W. Toft, F.C.A.

Hydronyl Ltd.

This is the new name of the Hydronyl Syndicate Ltd., London, S.W.7.

Shell Chemical appointments

Following the establishment of two separate divisions—Industrial Chemicals and Plastics and Rubbers—to handle all products other than agricultural, Shell Chemical Co. Ltd. announce several managerial appointments in their sales regions.

In industrial chemicals division, the the new northern regional manager is Mr. R. A. Taylor, who moves from Glasgow, where he was manager of Scottish sales region; Mr. W. F. Williams, previously solvents sales manager in northern sales region, becomes manager of Scottish sales region. Mr. N. W. D. Dewdney is appointed midland regional manager.

Mr. J. A. Hepworth, until recently northern regional manager, has moved to head office of industrial chemicals division in London as regional controller.

Plastics and rubbers division have formed two new sales regions. Mr. C. Duckworth, previously midland regional manager, is appointed manager, north sales region, plastics and rubbers division, his area including the Midlands and Scotland. Mr. J. A. Minch is the new manager for south sales region of this division.

Three new appointments in the Northern Sales Region, industrial chemicals division, are:

Mr. G. J. Tordoff, formerly general chemicals sales Manager, is appointed solvents sales manager.

Mr. G. B. Green, formerly assistant to the general chemicals sales manager, becomes general chemicals sales manager.

Dr. A. L. Bull has been appointed a representative in the engineering and surface coating fields.

Aspro-Nicholas marketing team

A team of marketing specialists has been appointed to advise the group marketing director of Aspro-Nicholas Ltd., the international organisation which operates in the United Kingdom, North, Central and South America, Europe, Middle East, Africa, India and Pakistan. The organisation already has factories in ten countries in these areas. The team includes marketing managers, advertising and public relations specialists, economists and medical and veterinary specialists.

Chemical Society prizewinner

The Chemical Society's Harrison memorial prize for 1959 has been awarded to Dr. Amyand Buckingham for his research work in physical chemistry and especially on account of his theoretical contributions to the understanding of solvent effects upon molecular spectra and to the theory of pressure-induced spectra. Dr. Buckingham is a graduate of the University of Sydney. He is now a demonstrator and lecturer in inorganic chemistry at Cambridge. This prize is awarded to British chemists under 30.

Changes in poisons list and rules

The Home Office notice of July 20, 1960, announced the preparation of Statutory Instruments changing the Poisons List and the Poisons Rules. This was deferred since other changes seemed imminent.

Statutory Instruments are now being prepared to give effect to the following further changes in the List and Rules recommended to the Secretary of State by the Poisons Board:

1. The following substances will be added to Part I of the Poisons List and to Part B of the Fourth Schedule to the Poisons Rules:
   α - 2 - chloro - 9 - (ω - dimethylaminopropylidene) - thioxanthene ("Taractan"), 7 - chloro - 2 - methylamino - 5 - phenyl - 3H(1:4) benzodiazepine - 4 - oxide and its salts ("Librium"), diethylpropion and its salts, ectylurea, ethchlorvynol, ethoheptazine and its salts, 2-imino-5-phenyloxazolidine-4-one and its salts, mephentermine and its salts, methaqualone and its salts, phendimetrazine and its salts, 1-phenyl-2-pyrrolidinopentane and its salts, propynylcyclohexanol carbamate, styramate, tetrabenazine and its salts.
2. Demecarium bromide will be added to Part I of the Poisons List and to the First Schedule and Part A of the Fourth Schedule to the Poisons Rules.
3. Endothal and its salts will be added to Part II of the Poisons List and to the First Schedule, Part A of the Fifth Schedule, paragraph 6 of the Seventh Schedule, and the Eighth Schedule to the Poisons Rules.
4. Azinphos-methyl and phosphamidon will be added to the list of phosphorous compounds in Part II of the Poisons List and in the First, and Third, Parts A and B of the Fifth, the Seventh and the Eighth Schedules to the Poisons Rules, and will also be added to the Sixteenth Schedule.

Vinyl Products to build new factory

Vinyl Products Ltd. and Vinatex Ltd., members of the Reichhold Chemicals Ltd. group, will be moving in two or three years' time from the site they share at Carshalton, Surrey.

A new works, complete with extensive offices and research and development laboratories, is to be built on the 100-acre site at Brockhampton near Havant, Hants.

The decision to close the Carshalton site results from lack of space to carry out the considerable expansion planned for the two companies. This has already been underlined by the completion of a new factory for Vinatex which will shortly come into production at New Lane, Havant, near the main Brockhampton site.

Vinyl Products Ltd. are the largest manufacturers in the U.K. of emulsions and solutions of a wide range of synthetic resins.

Fork lift hire scheme

In recent years the contract hire of cars by companies has become common. Now, George Cohen, Sons and Co. Ltd. are to offer fork-lift trucks on similar terms for the first time in Britain.

The contract covers all aspects of maintenance, relieving the hirer of the costs of providing his own service and repair facilities. It covers, too, the provision of "stand-in" trucks to take over in the event of breakdowns, thereby eliminating production hold-ups from this cause. Existing trucks can be purchased and replaced progressively by the latest machines. It follows, therefore, that the scheme can be entered into immediately without further capital expenditure. As with contract car hire, however, the most telling advantages are economic. The capital which would otherwise be tied up in fork trucks is freed for more productive investment; and the full amount of the payments under the contract is allowable as a business charge for income tax purposes.

The new scheme has been prepared by George Cohen's in collaboration with a leading producer of fork-lift trucks, Coventry Climax Engines Ltd.

U.V. rays for sterilising water

An arrangement has been signed between Engelhard Hanovia Lamps, a branch of Engelhard Development Company of Canada Ltd., and the "Alfloc" Water Treatment Service of Imperial Chemical Industries Ltd., whereby the latter will in future undertake sales and technical service in Great Britain and Northern Ireland of Hanovia ultra-violet radiation equipment for the sterilisation of water.

The advantages of ultra-violet radiation in water treatment will henceforth be considered in relation to other forms of sterilisation so that the best solution for any specific problem or set of conditions may be recommended.

Microchemistry course

Commencing January 14 a course of 12 lectures and appropriate practical work will be held on Saturday mornings at the Norwood Technical College, London, S.E.27, from 9.15 a.m. to 12.30 p.m. This course is particularly suitable for teachers, industrial and research chemists. The course is designed to survey the principal branches of chemistry in which small scale methods have been successfully applied.

Application forms for admittance to the course may be obtained from the secretary of the college. The London fee for the course is £1.

F.B.I. delegation for Nigeria

The Federation of British Industries has sent a 17-man delegation to Nigeria to take part in a Nigerian Industrial Development Conference. The leader is Sir Norman Kipping, Director General of the F.B.I. The chemical industry is represented by Mr. E. J. Langford, Overseas Controller, Imperial Chemical Industries Ltd.

Steel container firms merge

Victor Blagden and Co. Ltd. and London Containers and Noakes Ltd. propose to merge.

If the proposals are approved a holding company with the name of Blagden and Noakes (Holdings) Ltd. would be responsible for the management of the entire group. The existing companies would continue to trade under their own names. It is proposed that the merger should become effective from January 1, 1961.

Both companies are engaged in steel drum and container manufacture. Victor Blagden and Co. Ltd. also operate drum reconditioning and conversion plants.

Northern office for Venesta

The container department of Venesta Plywood Ltd. has opened a new Northern Sales Office at its Manchester factory. It will be complementary to the department's existing Sales Offices in London and Erith, Kent, and the address is Crabtree Lane, Clayton, Manchester 11 (Telephone: EASt 1628). Manager is Mr. S. R. Watson.

Oral polio vaccine only

Burroughs Wellcome have ceased production of their killed polio vaccine *Polimylex* and are now producing only the oral Sabin-type living attenuated virus vaccine. Large batches of all three Sabin-types of the vaccine have been prepared and tests on the materials are now nearly completed.

Arsenic limits in yeast

Regulations increasing from 2 to 5 p.p.m. the statutory limit for the arsenic content of brewers' yeast intended for use by manufacturers of yeast products came into operation in England and Wales last month. The limit for the final product when sold to the public and for all other yeast and yeast products remains at 2 p.p.m.

The Secretary of State for Scotland proposes to make corresponding regulations for Scotland and similar regulations for Northern Ireland are under consideration.

New address

Autopack Ltd., manufacturers of high-speed filling and sealing machines for ampoules, have moved to a new factory at Spring Lane, Malvern Link.

Wellcome grants for research

The Wellcome Trustees during the six months March 1-August 31, 1960, made grants exceeding £420,000 to assist medical research. An interesting feature of these benefactions was the awards, totalling no less than £168,000, made in Canada, Jamaica and the U.S.A.

Of these overseas grants, £50,000 has been allocated to the Massachusetts General Hospital, Boston, U.S.A., £17,000 to the University of Pennsylvania, Philadelphia, U.S.A., £40,000 for McGill University, Montreal, Canada, and £61,000 to the Medical Research Council for an epidemiological research unit in Jamaica.

The biggest single home grant was one of £50,000 for the Middlesex Hospital Medical School, University of London.

Franco-British pharmaceutical congress

The 1961 congress will be held in St. Helier, Jersey, from Friday, May 12, to Monday, May 15.

The Franco-British Pharmaceutical Commission has decided to put the relationship between French and British pharmacists on a different basis from that of merely attending congresses, and the secretaries of the two sides are to prepare a scheme for discussion whereby a kind of club might be formed to which pharmacists of both countries might belong. If it could be prepared in time it would be presented to the next congress.

Tables for NaCl and $CaCl_2$

The British Standards Institution announces that B.S.823, "Density-composition tables for aqueous solutions of sodium chloride and of calcium chloride" first published in 1938, has been revised. The tables themselves, based on the International Critical Tables, remain unchanged, but the accompanying text has been revised to accord with the latest edition of B.S.718, "Density hydrometers and specific gravity hydrometers." The tables give density in grams per millilitre of the aqueous solution, mass in grams of NaCl (or $CaCl_2$) in 100 g. of aqueous solution, and mass in grams of NaCl (or $CaCl_2$) in 1 litre of aqueous solution. For sodium chloride only, abridged tables are also included for ease of reference, which in addition give mass in pounds of NaCl in 10 gal. of aqueous solution.

Copies of this standard may be obtained from the British Standards Institution, 2 Park Street, London, W.1, price 8s. 6d.

New address

Holden and Brooke Ltd., manufacturers of pumps and heat exchange plant, have moved their Bristol office to 10 Aberdeen Road, Bristol 8. (Telephone: Bristol 30927.)

Christmas and New Year Greetings

We thank our many friends —advertisers, agents, contributors, readers, printers and suppliers—for greetings sent in the form of cards, calendars and diaries. Their good wishes are sincerely returned. In particular we thank:

Coty (England) Ltd.
Boots Pure Drug Co. Ltd.
Monsanto Chemicals Ltd.
C. Townsend Hook
Eden Fisher (Southend) Ltd.
T. I. Group
Englehard Industries
Billing and Sons Ltd.
Coene Père et fils S.A.
Du Pont Co. (U.K.) Ltd.
Westminster Laboratories Ltd.
London News Agency Photos Ltd.
A. Boake, Roberts and Co. Ltd.
L. Givaudan et Cie.
Roche Products Ltd.
Voice and Vision Ltd.
Gavin Starey Industrial Press Service
Mr. and Mrs. Ralph G. Harry
James Brewster, Industrial and Trade Fairs Ltd.
Spottiswoode Advertising Ltd.
E. F. Leak and Co. Ltd.
The National Pharmaceutical Union
Globe News Service Ltd.
I.C.I. Central Publicity Department
I.C.I. (Heavy Organic Chemicals) Ltd.
The Wellcome Foundation Ltd.
The Pharmaceutical Society of Great Britain
The Distillers Co. Ltd.
F. and D. Brownlie
Ciba (A.R.L.) Ltd.
Kenneth Tomlinson
Givaudan and Co. Ltd.
V. Vasic
Campbell-Johnson Ltd. (A.B.P.I. Press Office)
AEI-Birlec Ltd.
Marchon Products Ltd.
Chemische Werke Hüls A.G.
Venus Packaging Ltd.
The John Dale Organisation
May and Baker Ltd.
The South African Pharmaceutical Journal
John and E. Sturge Ltd.
Fordham Sadler Advertising Ltd.
Richmond Towers Ltd.
Albert Spitzer and Associates.
Venesta Foils Ltd.
Industrias de Alimentacao, Idal, Lda.
Duncan, Flockhart and Co. Ltd.
Bayer Products
Glaxo Laboratories Ltd.
Werbeagentur Prague
LEP Exhibition Contractors
Olympia Exhibitions Ltd.

Standard abbreviations

A vital need in this age of rapid scientific advancement is for a standard notation in which physicists, chemists, engineers and other technologists can express their ideas. Six years ago the British Standards Institution took a major step towards meeting that need when it published B.S.1991. *Letter symbols, signs and abbreviations.*

It has now been decided to make a comprehensive revision of Part 1 to reflect the considerable progress that has been achieved, nationally and internationally, during recent years. But meanwhile, having in mind the issue early in 1961 of four further parts to the standard,* B.S.I. has issued an amendment to Part 1 (obtainable as PD 3920). It brings into effect the more important modifications which are necessary to avoid inconsistency between the various parts. Copies of this amendment are available free of charge from the B.S.I. to all those holding copies of B.S.1991.

The following points of particular interest will be found among the revisions made in the amendment:

(1) In order to distinguish between the pound as a unit of mass and the weight of a pound under standard gravity as a unit of force, distinctive abbreviations are recommended for these two units, i.e. "lb" for pound mass and "lbf" for pound-force; likewise, "kg" for kilogram mass and "kgf" for kilogram-force, etc. The use of the letter "f" for this purpose follows a decision of the International Organisation for Standardisation and replaces earlier methods of making a distinction.

(2) It has been decided to maintain more rigorously than hitherto the general principle that symbolic abbreviations for units should not carry a full-stop as part of an abbreviation. This principle has been observed for many years by international standardising bodies, but there have been a few exceptions in B.S. 1991: Part 1. In future all the abbreviations for metric and British units in B.S.1991 will follow this principle. For example, the recommended abbreviations for horsepower and British thermal unit should be written "hp" and "Btu," without full-stops.

* The titles of the new parts will be: Part 1: Chemical engineering, nuclear science and applied chemistry; Part 2: Fluid mechanics; Part 3: Structures, materials and soil mechanics; Part 4: Heat engines.

Size reduction film

A new colour film called "An Introduction to Comminution" is now available on loan through the Gaumont British Film Library. Its style is simple and the aim is to instruct students and technologists. The film, made by International Combustion, shows the pattern of historical development, theoretical approach, research, testing and applications.

MEETINGS

Society of Chemical Industry

January 2. "Fuel cells," by Dr. H. H. Chambers. 6.30 p.m. 14 Belgrave Square, London, S.W.1.

Food Group

January 25. "Some biological effects of heated fats," by Prof. A. C. Frazer. 6.15 p.m. 14 Belgrave Square, London, S.W.1.

Corrosion Group

January 18. "Metallic diffusion coatings," by R. L. Samuel. 6 p.m. 14 Belgrave Square, London, S.W.1.

January 26. Conversazione. 6.30 p.m. 14 Belgrave Square, London, S.W.1.

February 7. Short papers (authors to be announced). 7 p.m. Engineering Centre, Stephenson Place, Birmingham.

Institution of Chemical Engineers

January 18. "Chemical process design," by J. M. Coulson. 6.30 p.m. Lecture Theatre A, Houldsworth School of Applied Science, Reservoir Street, Leeds 2.

January 24. "Mass transfer in drops and bubbles," by F. H. Garner. 5.30 p.m. The Geological Society, Burlington House, London, W.1.

January 24. "Experimentation and reactor design in process research and development," by W. Waddington and W. D. Betts. 7.30 p.m. Birkenhead Technical College, Birkenhead.

February 1. "Diffusion in aqueous solution," by F. H. Garner and P. J. Martin. 6.30 p.m. Midland Hotel, Birmingham.

Society for Analytical Chemistry

January 25. Discussion meeting. 6.30 p.m. The Feathers, Tudor Street, London, E.C.4.

January 27. "Chemical research in the electricity supply industry," by J. M. Ward. Glasgow.

January 28. A.G.M. and Chairman's address of Northern Section. 2.15 p.m. Nag's Head Hotel, Lloyd Street, Manchester.

February 1. "X-ray fluorescence." 7 p.m. Chemical Society, Burlington House, London, W.1.

Royal Institute of Chemistry

January 18. Lecture (subject to be announced) by Prof. Sir Cyril Hinshelwood, O.M. 6.30 p.m. King's College, Strand, London, W.C.2.

January 23. "Chemical control of plant diseases," by Prof. R. L. Wain. 7 p.m. Enfield Technical College, Queensway, Ponders End.

January 24. "The toxicology of fluorine compounds," by B. C. Saunders. 7.45 p.m. Technological Research Station, Spillers Ltd., Station Road, Cambridge.

January 25. "Magnetism in inorganic chemistry," by Prof. R. S. Nyholm. 7.30 p.m. College of Further Education, William Street, Slough.

February 1. Film show. 7 p.m. South-west Essex College of Technology, Forest Road, Walthamstow, London, E.17.

February 3. "Research and development in D.S.I.R. stations," by Sir H. W. Melville. 7.30 p.m. Brighton Technical College.

February 6. "Fuel cells," by H. H. Chambers. 6.30 p.m. S.C.I., 14 Belgrave Square, London, S.W.1.

February 7. "Organic reactions in strong alkalis," by Prof. B. C. L. Weedon. 6.30 p.m. Sir John Cass College, Jewry Street, London, E.C.3.

Chemical Society

January 17. Lecture by Sir Alexander Todd. 5 p.m. Chemistry Department, Nottingham University.

January 19. "Scientific journalism," by Dr. P. Ritchie Calder. 8 p.m. William Norton School, Norton-on-Tees.

January 19. "Production of phosphoric acid and ammonium phosphate based fertilisers," by Dr. J. S. S. Reay. 8 p.m. Chemistry Department, Aberdeen University.

January 20. "Co-ordination chemistry of some organo-metallic compounds," by Prof. G. E. Coates. 3.30 p.m. Royal College of Science and Technology, Glasgow.

January 23. "Quantitative studies of aromatic character," by Dr. L. M. Jackman. 5 p.m. University Chemical Laboratory, Lensfield Road, Cambridge.

January 23. "Spectroscopic studies of the hydrogen bond," by Dr. L. J. Bellamy. 5.30 p.m. Chemistry Department, University College, Cathays Park, Cardiff.

January 23. "Clatteration and occlusion," by Prof. R. M. Barrer. 4.30 p.m. The University, Leicester.

January 24. "Polonium," by Dr. K. W. Bagnall. 5 p.m. Chemistry Department, The University, Nottingham.

January 25. "The anatomy of gustation," by Prof. J. Hawthorn. 4.30 p.m. Chemistry Department, St. Salvator's College, St. Andrews.

January 25. "Recent developments in the theory of organo metallic compounds," by Dr. D. A. Brown. 5.30 p.m. Chemistry Department, Trinity College, Dublin.

January 26. "Ion-selective membranes," by Dr. F. L. Tye. 4 p.m. Chemistry Department, The University, Glasgow.

January 26. "Stereochemistry of some metal ions," by Dr. L. E. Orgel. 5 p.m. Department of Inorganic and Physical Chemistry, The University, Liverpool.

January 27. "Molecular energy transfer in gases," by Prof. T. L. Cottrell. 5.30 p.m. Chemistry Department, King's College, Newcastle-upon-Tyne.

January 27. "Hydrides and complex hydrides of the transition metals," by Dr. B. L. Shaw. 5 p.m. Chemistry Department, The University, Southampton.

January 30. "The development of modern gas kinetics," by Prof. A. F. Trotman-Dickenson. 5 p.m. Science Laboratories, The University, Durham.

January 31. "Some hydrocarbon complexes of transition metals," by Prof. P. L. Pauson. 7.30 p.m. Biochemistry Lecture Theatre, University New Buildings, Teviot Place, Edinburgh.

Society for Applied Bacteriology

January 11. Paper reading session in morning, and "Quantitative microbiology" at 2.15 p.m. Royal Society of Medicine, 1 Wimpole Street, London, W.1.

Society of Cosmetic Chemists

January 16. "The mechanism of detergency," by D. G. Stevenson. 7.30 p.m. Royal Society of Arts, John Adam Street, London, W.C.2.

Fertiliser Society

January 17. "Current fertiliser practice in relation to manurial requirements," by Dr. D. A. Boyd. 2.30 p.m. Geological Society, Burlington House, London, W.1.

Symposium on interaction between fluids and particles

The first part of the third congress of the European Federation of Chemical Engineering will be held in London from June 20-26, 1962, on the occasion of the Chemical and Petroleum Engineering Exhibition at Olympia. The major event in the programme is a three-day meeting organised by the Institution of Chemical Engineers on the subject "Interaction between Fluids and Particles."

Under this title the systems to be considered could, for example, embrace: Single particles (solid or liquid); Assemblages of particles—fixed, fluidised, moving.

Enquiries to the Institution of Chemical Engineers, 16 Belgrave Square, London, S.W.1.

£38,000-worth of glass pipes

Glass waste-pipes costing £38,000 are to be installed in the organic-chemistry block at Liverpool University QVF waste-lines are to be installed in all the laboratories, which total 50,000 sq. ft.

Original feature of the installation will be that the 4-in. pipelines serve a dual purpose, also carrying rain water from the roof.

AUSTRALIA

Petrochemicals boom

£50-odd million is being spent on developing Australia's petrochemical industry. This expenditure brings into being the first stages of an even more immense industry.

Talc exports

Western Australia's mineral resources have been boosted by the disclosure of more than a million tons of high-grade talc on the Geraldton Highway near Three Springs. In the last 10 years W.A. has produced nearly 24,000 tons of talc valued at some £335,500. The majority has been exported, Sweden being a big buyer.

More detergents

The Australian output of household detergents during the three months ended May 31 last totalled 176,000 cwt., which was an increase of 21,000 cwt., or 13·5% on the production figure of the corresponding three months in 1959.

Tariff enquiries

The Tariff Board is enquiring whether assistance should be given to the production in Australia of barium sulphate (including barytes) and witherite (including calcined witherite), tetrasodium pyrophosphate and sodium tripolyphosphate, and if this assistance should be through the tariff, what rates of duty should apply.

INDIA

Radioactivity and pest control

Radioisotopes and radiation present new tools for reducing the enormous losses in food and textile fibre crops and in animal produce, amounting to many billions of dollars annually.

The International Atomic Energy Agency (IAEA) therefore arranged a symposium on radioisotopes and radiation in entomology at Trombay, Bombay, in December.

Twenty-five papers by experts from nine member States (Federal Republic of Germany, India, Italy, Japan, Pakistan, Philippines, U.K., U.S.A., Russia) dealt with radiation effects on insects (sterilisation and lethal effects) and with the use of radioisotopes for the study of life and habits of insects, including their metabolism and physiology; the use of radioisotopes in insecticide research and the public health problems involved in the use of chemical insecticides.

Chemical insecticides are the main weapons to combat insect pests in agriculture, animal husbandry and forestry. Nuclear energy, in the shape of radioisotopes, can render insecticides more effective and prevent hazards to man, animals and crops resulting from their use.

By "labelling" insecticides with radioisotopes it becomes possible to trace their way within the insect at different stages of its life, and to study why they have toxic effects on certain species and why resistance to specific insecticides occurs or develops in others.

Since some insecticides might be harmful to man it is essential to establish whether they eventually reach him through his food and in what quantities. Radioisotopes introduced into such chemicals as tracers provide particularly sensitive methods for establishing, both qualitatively and quantitatively, residues of insecticides on human or animal feeding stuff.

These investigations may eventually lead to the establishment of international safety regulations for the use of different insecticides.

By feeding radioactive food to insects it also becomes possible to discover their living, breeding and migration habits.

U.S.A.

Dragoco's factory

The premises so far used by Dragoco Inc., on Broadway, New York, have again become too small. The expansion of business there did not permit them establishing production plant in the municipal area of New York. For this reason Dragoco secured a site at Totowa, New Jersey. The first factory building—equipped according to the firm's own designs—was occupied last month.

Wilhelm Karl, Prince of Prussia, the business manager of Dragoco, Holzminden, went to the U.S.A. for the inauguration of the new factory.

SWITZERLAND

Eastman form research company

Tennessee Eastman Co. have formed a new company, Eastman Research A.G. The new company is a Swiss corporation with offices and laboratories in Zurich. The company's activities will be directed primarily toward fundamental research in the fields of polymer chemistry and physics, catalysis, and in synthetic organic chemistry.

New headquarters for WHO

A new headquarters building is to be built for the World Health Organisation in Geneva.

The Swiss government is providing an interest-free loan of 20 million Swiss francs, and another of 10 million Swiss francs is being provided at a nominal interest by the State of Geneva.

M. Jean Tschumi, professor of architecture at the École Polytechnique de Lausanne, is the architect of the projected ten-storey building which will cover 16,425 sq. metres. The "curtain" façade is composed of glass walls with aluminium sun-break elements on a framework of reinforced concrete covered with marble.

ITALY

F.I.P. congress

The scientific section of the Federation Internationale Pharmaceutique (F.I.P.) will hold the 21st Congress in Pisa from September 4 to 8. Copies of the programme are available from the Secretary-General, Dr. A. E. Vitolo, Piazza F. Carrara 10, Pisa.

ISRAEL

Citric acid plant planned

Miles Chemical Laboratories Inc. is reported to be planning to invest $2 million in the construction near Haifa of a citric acid factory using the parent company's production process. The enterprise will later extend into other fields involving the fermentation process developed by the American company—among them the production of enzymes, vitamins and antibiotics.

New sulphonation process

Details about a new sulphonation process based on elementary sulphur, transformed in a small pocket plant to SO_3, and used for the direct sulphonation of detergent raw materials were revealed by the inventor A. Davidsohn during the 3rd International Congress on Surface Activity in Cologne last year. The first plant of this kind has been set up and put into operation for the Zohar Soap and Detergent Factory at Kibbuz Dalia. The products obtained by this new process are claimed to be practically free of salts, odourless, and of excellent colour. They are already being exported from Israel.

To illustrate the process, here are some data: to sulphonate 100 parts alkyl-benzene by the conventional sulphonation process one uses 150-160 parts sulphuric acid or 105-110 parts oleum. Sulphonating with liquid SO_3 one needs 35-36 parts liquid SO_3. For sulphonation by the new process only 15-16 parts sulphur (*e.g.* Texas sulphur or French gas-sulphur) are used. There is no spent-acid disposal problem. Only technical pure sulphur and the materials to be sulphonated enter the plant, and only the sulphonated product is removed.

HUNGARY

Artificial cotton wool

Manufacture has begun of an artificial fibre from which cotton-wool can be made. It is estimated that this will save the drug industry £1 million in imports.

T.B. drugs combined in tablet

Twice-daily dosage for tuberculosis is a growing favourite with doctors and patients but is at present restricted to those able to take their drugs in standard cachet form. Smith and Nephew Pharmaceuticals Ltd. have now succeeded in incorporating isoniazid into their "fat protected" P.A.S. granule, *Pasade* (which remains available). The two standard T.B. drugs P.A.S. and isoniazid are now available in palatable granule form known as *Inapasade*.

This product, which is available in heat-sealed packets in containers of 60 and 120 and a bulk pack of 1,000 grammes loose granules, is a palatable preparation for those unable to tolerate P.A.S. and isoniazid in ordinary cachet form. The daily dose provides 12 g. sodium P.A.S. + 300 mg. isoniazid.

Packs containing 60 and 120 packets retail at 71s. 3d. and 131s. 3d. respectively and a 1,000 g. bulk pack costs 120s. (all ex. P.T.).

Cold treatment

Rinurel tablets made by William R. Warner and Co. Ltd. are now available for treating the common cold symptomatically. A single tablet is claimed to relieve the pain of sinus headache and the discomfort of the common cold.

They decongest sinus and nasal mucosa to relieve pressure and promote drainage; abort pain with two analgesics; reduce rhinorrhœa and sneezing with an antihistamine.

The formula:

Paracetamol	150 mg.
Phenacetin	150 mg.
Phenylpropanolamine hydrochloride	25 mg.
Phenyltoloxamine dihydrogen citrate	22 mg.

Two tablets are advised initially, followed by one every 4 hr. Prophylactically, one should be taken every 4 hr.

Packs of 30 retail at 10s. 6d. inc. P.T.

Treatment of obesity

The two active ingredients in *Filon*, made by West Pharmaceutical Co. Ltd., 3-methyl 2-phenylmorpholino-8-chlorotheophyllinate and 2-(3-methyl-2-phenylmorpholino) ethyl α-phenylbutyrate hydrochloride, have a dual action. They are claimed to act synergistically and centrally in suppressing the sensation of hunger, and antagonistically and peripherally in their effect on the heart and circulation. This means that cardiac activity is not stimulated and blood pressure is not increased in normal and hypertensive patients.

The stimulant effect is only mild, being between amphetamine and caffeine. Its toxicity is half that of caffeine and one-sixth that of amphetamine. The product has a mild diuretic action, and it is claimed that it does not cause addiction or tolerance.

Soap treatment of acne

A new soap called *Deep* containing a new substance, *Irgasan* BS.200, is claimed to "clear greasy skin and acne completely." *Irgasan* BS.200 is fungicidal and bactericidal and it combats fungi with a deodorising effect that follows the elimination of bacteria.

The new soap treatment retails at 3s. per tablet. It is manufactured by Charles Bedeman Ltd., London.

Vitamin B_{12} syrup

A syrup of B_{12} has just been produced by Vitamins Ltd. It contains only vitamin B_{12} in a flavoured syrup base. Other vitamin B factors have been deliberately omitted as their presence is not regarded as therapeutically desirable.

Although the parenteral route of administration is an absolute indication for patients suffering from Addisonian pernicious anæmia, oral administration permits absorption by other patients and there is growing evidence of the value of vitamin B_{12} in a number of conditions associated with disorders of protein and fat metabolism.

The concentration is 10 μg/ml. of Cyanocobalamin B.P. Pack: a 6 fl. oz. bottle retailing at 5s. 7½d.

Sandalwood oil substitute

Givaudan are now producing Sandela Gd., a polycyclic alcohol with the characteristic persistent and tenacious odour of natural sandalwood oil. This chemical is available in commercial quantities at a price less than one-third the market price of sandalwood oil itself. It is claimed that the product is compatible with most toiletries and cosmetics.

Timber protection

Preservation Developments Ltd. are making two new products for protecting logs from attack by beetles and fungi. These products are miscible with either oil or water, which simplifies practical problems of application.

The products, *Hexaplus* and *Protoplus*, are used for protection of both hardwood and softwood logs.

Hexaplus contains gamma BHC, which has proved the most effective and economical against bark beetles and ambrosia beetles. *Protoplus* also contains gamma BHC, but includes a chlorinated phenolic fungicide to prevent infection by fungi causing sap stain and dote.

Dye gives improved turquoise blues

The latest addition to I.C.I.'s Procion H dyestuffs is in the field of reactive turquoise blues. Procion Brilliant Blue H5G has excellent building-up properties and freedom from staining during washing-off. It also possesses high tinctorial value and thus offers economic advantages over other reactive turquoises.

The new dye is applied by the recommended recipes for Procion H dyes, using either conventional or emulsion thickenings. Besides its value in self-shades, it is suitable for admixture with yellow Procion H dyes to give brilliant greens.

The high tinctorial strength and low affinity of the dye will be suited to continuous dyeing processes.

Dishwashing compound

Diversey (U.K.) Ltd. have produced a new chlorinated machine dishwashing compound—*Divoklor*. It is claimed to control the staining of tea and coffee cups, both china and plastic as well as cleaning them. Dried-on food residues, lipstick, grease and oils are removed at one passage through the machine. *Divoklor* is a yellow granular product, free-flowing and readily soluble in water. The non-foaming characteristics ensure that adequate pump pressures are maintained throughout the wash cycle.

Fatty hydroxamic acids

Two fatty hydroxamic acids, oleyl- and fatty C-16 C-18-hydroxamic acids, have been marketed in U.S.A. These interesting chemical intermediates have a reactive OH and NH group, as well as a long chain fatty group. They can react with alkalis, metallic ions and acylating agents. Some of the metallic salts are highly coloured. On heating they form isocyanates which can be reacted further with alcohols and amines to form urethanes and ureas respectively. The isocyanates form carbamic acids with water.

They may be used for surface-active compounds, pigment dispersants, dyeing aids, detergents, disinfectants, tanning aids, anti-oxidants, corrosion inhibitors, lubricant additives, flotation reagents, water repellents, metal deactivators and chelating agents.

These acids are being manufactured by Woburn Chemical Corp., Harrison, N.J., U.S.A.

THE CHEMICAL MARKET

CHLORINATED SOLVENTS CHEAPER

LONDON.—I.C.I. has reduced the prices of **trichloroethylene** and **perchloroethylene.** Trichloroethylene is reduced by £1 per ton and perchloroethylene by £5 per ton. Also, methylene chloride and technical chloroform have been reduced by £3 per ton and £20 per ton respectively.

Citric acid has been reduced by 19s. cwt. **Zinc oxide** is also down by £6 10s. ton.

FINE CHEMICALS

Acetanilide 12½ kg. 7s. 4d. kg.
Arsenic trioxide
5 to 10-ton lots £37 ton
Ascorbic acid
100 kg. £3 6s. 6d. kg.
Aspirin
1-cwt. lots in bags 4s. 10d. „
5-cwt. 4s. 8d. „
Atropine
Sulphate, 500 g. £59 18s. 6d. kg.
Alkaloid, 500 g. £68 15s. kg.
Benzene B.P.C. 28-lb. lots 1s. 8d. lb.
Benzoic acid 12½ kg. 7s. 4d. kg.
Benzyl benzoate
1-cwt. lots 5s. lb.
Bismuth oxide B.P.C. 1934
28-lb. lots 26s. 10d. lb.
Bismuth salts 1-cwt. lots:
Carbonate 20s. lb.
Subgallate 19s. 3d. „
Salicylate 19s. 9d. „
Subnitrate 18s. „
Borax B.P.
Powder £60 10s. ton
Extra fine £61 10s. „
Boric acid B.P.
Crystal £99 „
Powder £96 10s. „
Bromine B.P.C. 7-lb. lots 6s. lb.
Caffeine 50 kg. 42s. 6d. kg.
Calamine 50 kg. 4s. kg.
Calcium gluconate
1-cwt. lots dlvd. 3s. 7d. lb.
Calcium glycerophosphate
50 kg. 28s. 6d. kg.
Calcium lactate B.P.
28-lb. lots 2s. 7d. lb.
1-cwt. lots 2s. 4d. „
Chloral hydrate 50 kg. 10s. kg.
Citric acid B.P. Powder or granulated:
1-4cwt. lots in bags 193s. cwt.
5-19cwt. lots „ „ 189s. „
Codeine
Alkaloid 100 g. £138 10s. kg.
Phosphate 100 g. £110 „
Cream of tartar
1-cwt. lots £12 5s. cwt.
5-cwt. lots £12 3s. „
Ephedrine
Hydrochloride 3 kg. £7 1s. 1d. kg.
Alkaloid 3 kg. £12 7s. „
Sulphate 3 kg. £7 1s. 1d. „
Eucalyptol
1-cwt. lots 11s. lb.
5-cwt. lots 10s. 6d. „
Ferri ammonium citrate B.P.
1-cwt. lots, scales 4s. 5½d. lb.
1-cwt. lots, granules 3s. 7½d. „
Ferrous gluconate B.P.
1-cwt. lots dlvd. 6s. 3d. lb.
Gallic acid B.P.C.
1-cwt. lots 10s. „
Gluconic acid technical 50%
Minimum 12-gal. drums
19s. gal., drums extra, returnable
Glucono delta lactone
1-ton lots dlvd. 5s. net lb.
Glycerophosphoric acid
24 litres 11s. 10d. litre
Glycine (amino acetic acid)
12½ kg. 18s. 10d. kg.
Hexyl resorcinol 10 kg. £7 10s. „
Hydroquinone 12½ kg. 23s. 10d. „
Iodides
Ethyl 4 kg. bottles 66s. kg.
Mercury, red B.P.C.
12½ kg. lots 58s. 6d. „
Potassium B.P.
12½ kg. lots 19s. 10d. „
Sodium B.P.
12½ kg. lots 24s. 9d. „
Iodine, Chilean crude,
99% min. in wooden casks 17s. 4d. kg.
Iodoform
12½ kg. and under 50 kg. 42s. 6d. kg.
Lactose 50 kg. 3s. 2d. kg.
Lithium salts 5-cwt. lots
Benzoate 10s. lb.
Carbonate B.P.C. 11s. 3d. „
Chloride (commercial) powder
11s. „
„ granular 10s. 9d. „
Hydroxide 9s. 9d. „
Citrate B.P.C. 9s. „
Sulphate 8s. 6d. „
Salicylate, 10 cwt., dlvd. 9s. 9d. „
Magnesium carbonate B.P.
Light cwt. lots dlvd. £129 ton
Magnesium trisilicate 28-lb. packs
28-lb. lots 4s. 3d. lb.
1-cwt. lots 3s. 10d. „
5-cwt. lots 3s. 7d. „
Bulk rates for larger quantities are from 3s. 1d. lb. in 1-ton lots
Manganese hypophosphite B.P.C.
7-lb. lots 13s. 11d. lb.
1-cwt. lots 12s. 11d. „
Mercuric chloride B.P.
50-kg. lump 48s. 6d. kg.
Methyl salicylate 1-cwt. lots 3s. 3d. lb.
Morphine
Alkaloid, 100 g. £138 18s. 4d. kg.
Nicotinamide 1 kg. £2 10s. 6d. kg.
Nicotinic acid
12½ kg. 32s. 9d. kg.
1 kg. 35s. „
Oleine B.P. extra pale, 3/4 cwt. drums returnable carriage paid G.B.
£160 ton
Phenolphthalein 50 kg. 24s. 3d. kg.
Phosphoric acid B.P.
(s.g. 1·750) 10-carboy lots 1s. 4d. lb.
Potassium permanganate B.P.
1-cwt. lots dlvd. 1s. 11¾d. lb.
Procaine hydrochloride (foreign)
2 kg. 59s. kg.
Quinine sulphate 100 oz. 2s. 9½d. oz.
Riboflavin
100 g. 5½d. g.
10 g. 7d. „
Saccharin
500 g. £7 4s. for this quantity
Salicylic acid B.P.
1-cwt. lots dlvd. 3s. 2½d. lb.
Silver nitrate
500 g. 4s. 11¾d. oz.
Sodium benzoate B.P.
1-cwt. lots 2s. 9½d. lb.
1-ton lots 2s. 7½d. „
Sodium gluconate technical
3-cwt. lots dlvd. 3s. net lb.
Sodium salicylate
50 kg. 8s. 8d. kg.
12½ kg. 9s. „
Sodium thiosulphate
Crystals, photographic quality
1-ton lots 49s. cwt.
Stearic acid B.P.C. flake, carriage paid G.B. £154 ton
Strychnine 25 oz. and under.
Alkaloid 11s. 3d. oz.
Hydrochloride 11s. 3d. „
Sulphate 10s. 3d. „
Sulphaguanidine
12½ kg. 33s. kg.
50 kg. 32s. „
Sulphanilamide
12½ kg. 16s. 6d. kg.
50 kg. 15s. 4d. „
Sulphathiazole 12½ kg. 39s. 9d. „
Tannic acid B.P. Levis
1-cwt. lots 10s. lb.
Tartaric acid B.P.
Powder or granulated, in kegs.
10 cwt. or more £15 cwt.
Terpineol B.P.
40-gal. drums 2s. 4½d. lb.
1-cwt. lots 2s. 7d. „
Theophylline B.P.
500 g. 27s. 6d. for this quantity
Thiamine hydrochloride
100 g. 3d. g.
1 kg. £9 5s. kg.
Thioglycollate
Ammonium 12s. 4d. to 16s. 4d. lb.
Calcium:
7-lb. lots 17s. 3d. „
5-cwt. lots 14s. 3d. „
α-Tocopherol 25-g. lots 11½d. g.
Vanillin 23s. 6d. lb.
Zinc oxide B.P.
2-ton lots dlvd. £106 ton

GENERAL CHEMICALS

Acetic acid 500 gals. bulk dlvd. U.K.
80% Technical £81 ton
80% Pure £87 „
Glacial B.P. £101 „
98-100% Glacial £97 „

Acetic anhydride
1-ton lots dlvd. £128 ton
Acetone
5-gal. drums, free, non-returnable £124 ton
40 to 45-gal. drums, 10-ton lots and over £80 „
Alum, potassium granular crystals
50 kg. 1s. 2d. kg.
Aluminium hydroxide B.P.C. 34
28-lb. lots 2s. 4d. lb.
Aluminium stearate (Standard)
(Precipitate) 1-ton lots £233 10s. ton
Ammonia
Persulphate £6 13s. 6d. cwt.
Phosphate: Mono- £106 ton
Di- £97 10s. „
Amyl acetate
B.S.S. 10 tons and over £251 ton
Technical £249 „
Amyl alcohol
Technical in 1-ton lots £256 ton
Arsenic White powdered ex store £42 ton
***n*-Butyl acetate**
10-ton lots in drums £165 ton
***n*-Butyl alcohol**
10-ton lots in drums £137 10s. ton
Calcium chloride
Solid and Flake, dlvd. in 1-ton lots £16 10s. ton
Calcium oxide (Lime)
Ex marble 28-lb. lots 3s. 10d. lb.
Caustic soda
Solid in drums, dlvd. £37 16s. 6d. ton
Flake in drums, dlvd. £35 10s. 6d. ton
Chloroform B.P. ½-ton lots 2s. 11½d. lb.
Chromic acid
Dlvd. U.K. (less 2½%) 2s. 0¼d. to 2s. 0¾d. lb.
DDT (Technical) 3s. lb.
2 : 4-Dichlorophenoxyacetic acid
99% pure, 1-cwt. bags £320 ton
Dimethyl sulphate
3-cwt. drums 1s. 11d. lb.
Ether (Diethyl ether)
Tech. B.S.S. and Solvent B.P.
1-ton lots in drums 2s. lb.
Ethyl acetate
10-ton lots in drums £137 ton
Ethyl alcohol
95% Gay Lussac 66·0 o.p.
over 300,000 proof gallons per year in tank wagons
3s. 2¾d. per proof gal.
Ferrous sulphate 50 kg. 1s. 4d. kg.
Formaldehyde
40% by volume dlvd. England
1-ton lots £39 15s. ton
Glycerin
1·2627 s.g. chem. pure, 5 tons and up, 5-cwt. drums £241 10s. ton
1·2627 s.g. technical grade, 5 tons and up, 5-cwt. drums £236 10s. ton
Hexamine
1-ton lots
Technical, bulk 1s. 7½d. lb.
B.P.C. 1s. 10½d. lb.
Hydrochloric acid
Commercial 18s. 6d. cwt.
Hydrogen peroxide 1-cwt. lots
27·5% weight £115 ton
35% weight £138 „
Lactic acid (1-ton lots)
Pale tech. 44% by weight 1s. 3¼d. lb.
Dark tech. 44% by weight 9¼d. lb.
Magnesium chloride
Solid (ex wharf): 1-ton lots £18 10s. ton
Magnesium sulphate £15 ton
Mercurous chloride (calomel)
50 kg. 65s. kg.
Mercury sulphide, red
Ton lots and over 30s. 6d. lb.
Methylated spirits (Industrial)
Perfumery quality 500 gal. and upwards: gal.
64 o.p. 7s. 4d.
74 o.p. 7s. 11d.
5 gal.:
64 o.p. 8s. 7½d.
74 o.p. 9s. 2½d.
Methyl ethyl ketone
10 tons dlvd. in drums £134 10s. ton
Methyl isobutyl carbinol
10 tons and up, in drums, dlvd. £159 ton
Naphthalene
Crystal, dlvd., 4-ton lots, spot £66 ton
Ball and flake (ditto) £86 15s. „
Nickel sulphate
dlvd. ton lots £189 ton
Nitric acid 70% intermediate £36 ton
Pentachlorphenol
Flake, technical, in 100 lb. fibre/steel kegs dlvd. 2s. 4d. lb.
Phenol Ice crystals:
1 ton dlvd. 1s. 5d. lb.
10 tons and over dlvd. in returnable 45 gal. drums 1s. 3d. lb.
Phthalates
10-ton lots in drums
Diethyl (B.S.) £201 ton
Dimethyl (B.S.) £194 ton
Potassium bromide
50 kg. 5s. 6d. kg.
12½ kg. 5s. 8d. „
Potassium carbonate
Calcined 96 to 98% (1-ton lots ex store) in bags £75 10s. ton
Hydrated (1-ton lots) £74 „
Potassium fluoride
28-lb. lots 5s. 1d. lb.
Potassium sodium tartrate
5-cwt. lots in kegs £11 cwt.
Soda ash
1-ton lots non-returnable 2 cwt. bags. from £13 15s. 6d. to £15 16s. 6d. ton
Sodium hydroxide 28-lb. lots:
sticks (1-lb. bottles) 4s. 3d. lb.
pellets „ „ 3s. 9d. „
Sodium metal 28-lb. lots 3s. 8d. „
Sodium metasilicate
Dlvd. U.K. in ton lots £26 ton
Sodium phosphate
Dlvd. ton lots: Di-sodium, crystalline £40 10s. ton
Anhydrous £88 „
Tri-sodium, crystalline £39 „
Anhydrous £86 „
Sodium silicate according to grade dlvd. in drums £12 10s. to £19 15s. ton
Sodium sulphate Ex-works:
(Glauber salt) £13 ton
(Salt cake) unground, full truck loads £8 16s. 6d. ton
Sodium sulphide
Broken, returnable drums, dlvd. ton lots £37 2s. 6d. ton
Flake, ditto £38 12s. 6d. „
Solid ditto £36 2s. 6d. „
Sodium sulphite
Commercial crystals £27 5s. ton
(Dlvd. London in 2-cwt. single non-returnable bags)
Sodium tripolyphosphate
1-ton lots £95 ton
Stannic chloride 28-lb. lots 3s. 11d. lb.
Stannous chloride 28-lb. lots 9s. 5d. lb.
Strontium carbonate
96-98% 28-lb. lots 3s. lb.
Sulphuric acid, ex-works, according to quality and quantity
B.O.V. 78% from 8s. to 10s. cwt.
C.O.V. 96% from 11s. to 14s. cwt.
Zinc chloride
28-lb. lots sticks 6s. 9d. lb.

OILS AND FATS

Palm kernel oil
Refined, deodorised, 2-ton lots, naked, ex-works £116 ton
Palm oil
Refined, deodorised, 2-ton lots, naked, ex-works £102 ton
Stearine
dlvd. free bags
Pristerene 64 flake £148 ton
Pristerene 62 flake £133 „
Pristerene 61 flake £113 „
A premium of £2 ton is charged for powder and £4 for block

GUMS AND WAXES

Agar Agar No. 1
Kobe strip 17s. lb.
Powder 22s. 6d. „
Beeswax
Dar-es-Salaam spot (nominal) £26 10s. cwt.
Sudan spot (duty paid) £24 „
Bleached white (slab) £29 10s. „
Refined yellow (slab) £26 „
Benzoin
Sumatra spot £26 10s. cwt.
Siam spot £2 5s. lb.
Candelilla Spot £23 15s. cwt.
Carnauba
Prime, Spot £38 cwt.
Fatty grey £28 „
Gum arabic Lump £9 cwt.
Karaya Powder, Spot 3s. 4d. lb.
Paraffin wax
1-ton lots, acc. to grade £105 to £130 ton
Peru balsam 10s. 6d. lb.
Shellac
No. 1 orange £14 cwt.
No. 2 orange £12 10s. „
Transparent white 4s. 3d. lb.
Pale dewaxed 6s. „
Tragacanth
No. 1 spot £152 10s. cwt.
No. 2 spot £145 „
Pale leaf £65 „
Amber £38 „
Brown to Red £29 „

NEW TRADE MARKS

APPLICATIONS

Pharmaceuticals

PENCEF.—806,306. *The Distillers Co. (Biochemicals) Ltd.*

URSO.—798,959. *Tokyo Tanabe Seiyaku Kabushiki Kaisha.*

TRAMAGIN.—800,381. *I.C.I. Ltd.*

THROCETS.—803,176. *Potter and Clarke Ltd.*

AUTOMAGIC.—B792,072. *Antoine François Regis Peyron.*

COLOXYL.—792,225. *Fauns and McAllan Pty. Ltd.*

BEOOVITE.—795,897. *Vitamins Ltd.*

CARISOMA.—797,401. *Glaxo Laboratories Ltd.*

GERIOVITIL.—797,679. *Arzneimittelwerk Fischer O.H.G.*

CONTINUS.—798,096. *Roche Products Ltd.*

LEXITAN.—798,103. *Roche Products Ltd.*

HONE-JEL.—B800,490. *British Chemotheutic Products Ltd.*

PARSTEJAN.—801,930. *Smith Kline and French Laboratories Ltd.*

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Miscellaneous

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Dioxaphosphorinanes and their preparation. *Hooker Chemical Corporation.* 853,798.

Process for the preparation of organodichloroboranes. *Olin Mathieson Chemical Corporation.* 854,924.

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Process for the preparation of crystalline 1, 2, 3, 4-tetrahydronaphthalene-1-hydroperoxide. *Dehydag Deutsche Hydrierwerke G.m.b.H.* 854,355.

Aromatic sulphonylamino compounds containing trifluoromethyl radicals. *Farbenfabriken Bayer A.G.* 854,956.

Polymerization of chloroprene. *Farbenfabriken Bayer A.G.* 854,979.

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Derivatives of 5-nitro-2-furfuraldehyde. *Norwich Pharmacal Co.* 853,841.

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Sulphonyl urea antediabetic agent and preparation thereof. *C. Pfizer and Co. Inc.* 853,555.

Pharmaceutical compositions and methods for producing phenylcyclohexane compounds. *Parke, Davis and Co.* 853,775.

Albumin diagnostic compositions. *Miles Laboratories Inc.* 853,643.

Process for preparing diisopropenyldiphenyl and homologs thereof. *White Laboratories Inc.* 855,004.

Penicillamine production process. *Distillers Co. Ltd.* 854,339.

Substituted organic phosphine derivatives. *Albright and Wilson (Mfg.) Ltd.* 854,182.

Stabilization of lanolin. *Colgate-Palmolive Co.* 854,111.

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NEW COMPANIES

These particulars of new companies have been extracted from the daily register of Jordan and Sons Ltd. company registration agents, Chancery Lane, London, W.C.2.

Laxton and Jones (Chemists) Ltd. 16.9.60. Crabtree Close, Picket Hill, Ringwood, Hants. £10,000. Dirs.: Leonard C. and Mrs. Doris F. Laxton.

Read's Chemists (Mile Cross) Ltd. 4.10.60. 289 Aylsham Rd., Norwich. £1,500. Dirs.: Dorothy G. Read and Ashley F. Breeze.

Heath Pharmacy Ltd. 5.10.60. 475 Staines Rd., Hounslow. £5,000. Dir.: Bernard L. Horne.

M. Murphy (Chemists) Ltd. 6.10.60. 105 Trafford Rd., Salford. £1,000. Dirs.: Michael and Joanna Murphy.

Willetts and Bradley Ltd. 7.10.60. 488 Coventry Rd., Small Heath, Birmingham. Chemists, druggists, etc. £1,000. Dirs.: Malcolm S. and Margaret I. Willetts.

Geoffrey Back (Chemists) Ltd. 10.10.60. 155 High St., London, N.16. £1,000. Dirs.: Geoffrey and Mrs. Shealegh M. Back.

Hughes and Leach Ltd. 10.10.60. 34-40 Ludgate Hill, London, E.C.4. Chemists, opticians, etc. £1,000. Dirs.: Stanley Hughes and G. A. Leach.

Watton Pharmacy Ltd. 13.10.60. 32 High St., Watton, Norfolk. £5,000. To take over the bus. of a chemist, etc., cd. on by Derek D. Horsburgh at 9 and 32 High St., Watton. Dirs.: G. Mitchell and W. F. Smith.

Olins Chemists Ltd. 14.10.60. 82 Portland Place, W.1. £1,000. Dirs.: H. and A. Olins.

T. W. Morgan (Macclesfield) Ltd. 15.9.60. 209 Park Lane, Macclesfield. Chemists, etc. £3,000. Dirs.: Thomas W. and Irene Morgan.

Special Purpose Chemicals

Uses Bulletin

For the preparation of shampoos for human and veterinary use, hand cleaning gels, germicidal skin cleansers—**EXONICS,** high foaming, low odour, mild surfactants, compatible with most phenolic bacteriocides.

For the preparation of germicidal creams and ointments, hair conditioning creams and most cosmetic emulsions where cationic properties are desirable —**COLLONE QA** (Cationic Emulsifying Wax BPC).

For use in dairy sanitisers, antiseptic lotions, sterilising detergents, germicidal sprays, etc. —**MORPANS,** a wide and versatile range of quaternary ammonium compounds.

Glovers (Chemicals) Ltd., Wortley Low Mills, Leeds, 12 Telephone: 63-7847/8/9 Telegrams: "Glokem, Leeds"

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NEW COMPANIES

These particulars of new companies have been extracted from the daily register of Jordan and Sons Ltd. company registration agents, Chancery Lane, London, W.C.2.

Laxton and Jones (Chemists) Ltd. 16.9.60. Crabtree Close, Picket Hill, Ringwood, Hants. £10,000. Dirs.: Leonard C. and Mrs. Doris F. Laxton.

Read's Chemists (Mile Cross) Ltd. 4.10.60. 289 Aylsham Rd., Norwich. £1,500. Dirs.: Dorothy G. Read and Ashley F. Breeze.

Heath Pharmacy Ltd. 5.10.60. 475 Staines Rd., Hounslow. £5,000. Dir.: Bernard L. Horne.

M. Murphy (Chemists) Ltd. 6.10.60. 105 Trafford Rd., Salford. £1,000. Dirs.: Michael and Joanna Murphy.

Willetts and Bradley Ltd. 7.10.60. 488 Coventry Rd., Small Heath, Birmingham. Chemists, druggists, etc. £1,000. Dirs.: Malcolm S. and Margaret I. Willetts.

Geoffrey Back (Chemists) Ltd. 10.10.60. 155 High St., London, N.16. £1,000. Dirs.: Geoffrey and Mrs. Shealegh M. Back.

Hughes and Leach Ltd. 10.10.60. 34-40 Ludgate Hill, London, E.C.4. Chemists, opticians, etc. £1,000. Dirs.: Stanley Hughes and G. A. Leach.

Watton Pharmacy Ltd. 13.10.60. 32 High St., Watton, Norfolk. £5,000. To take over the bus. of a chemist, etc., cd. on by Derek D. Horsburgh at 9 and 32 High St., Watton. Dirs.: G. Mitchell and W. F. Smith.

Olins Chemists Ltd. 14.10.60. 82 Portland Place, W.1. £1,000. Dirs.: H. and A. Olins.

T. W. Morgan (Macclesfield) Ltd. 15.9.60. 209 Park Lane, Macclesfield. Chemists, etc. £3,000. Dirs.: Thomas W. and Irene Morgan.

Special Purpose Chemicals

Uses Bulletin

For the preparation of shampoos for human and veterinary use, hand cleaning gels, germicidal skin cleansers—**EXONICS,** high foaming, low odour, mild surfactants, compatible with most phenolic bacteriocides.

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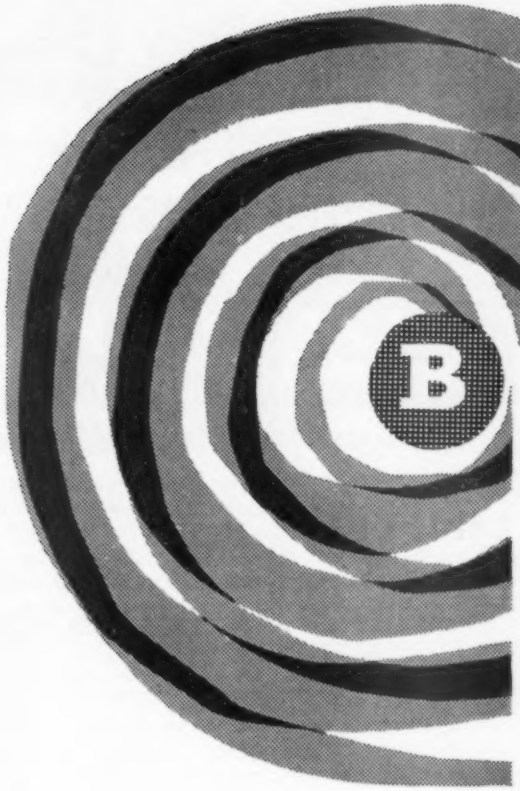

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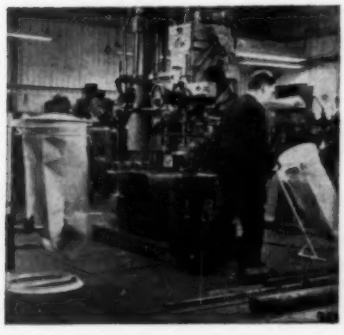

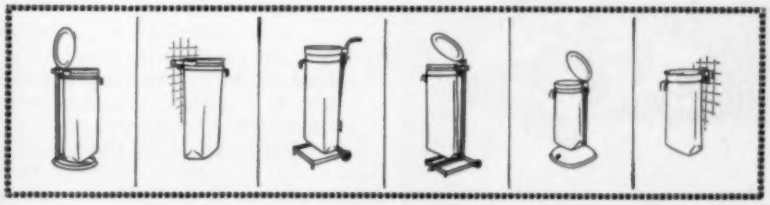

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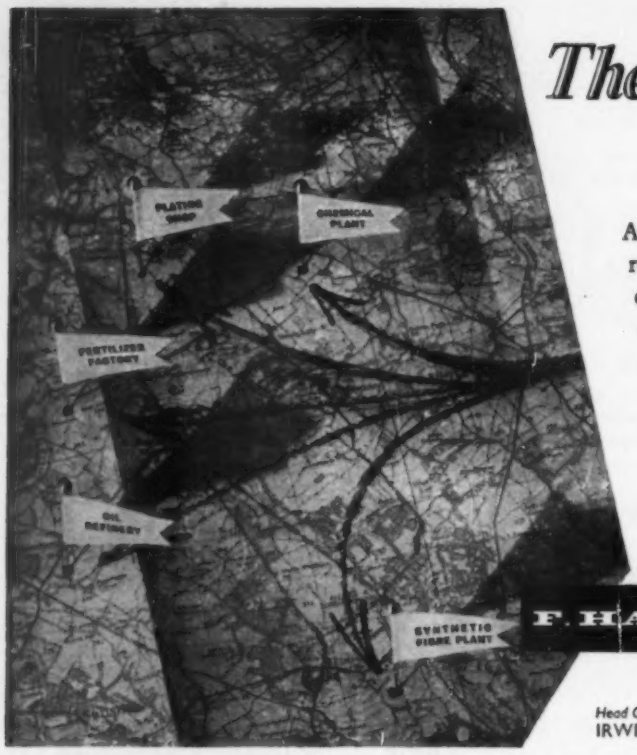

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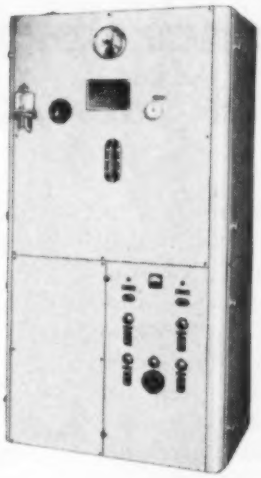

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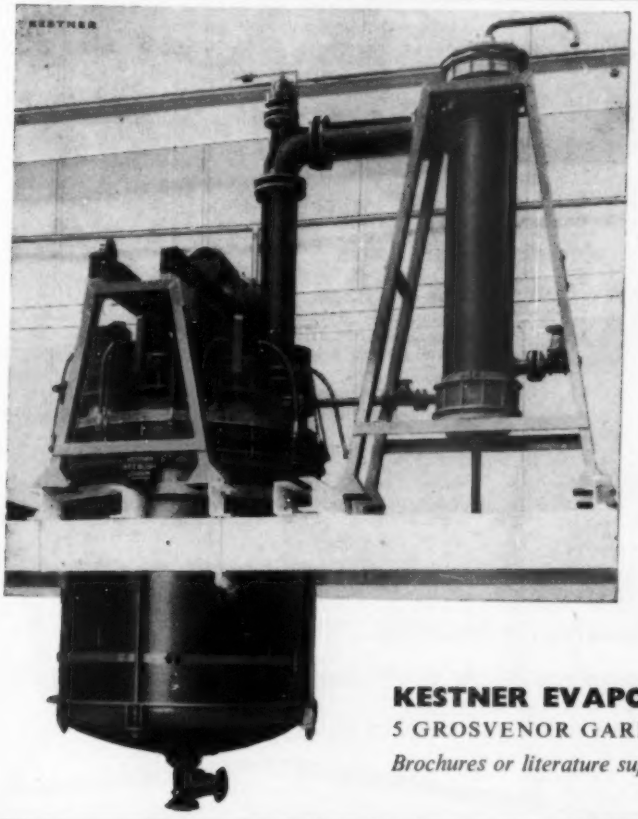

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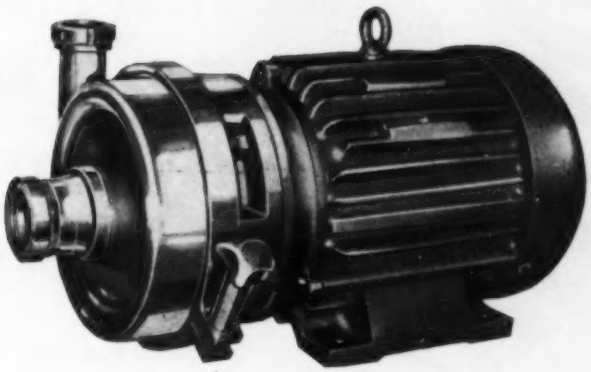

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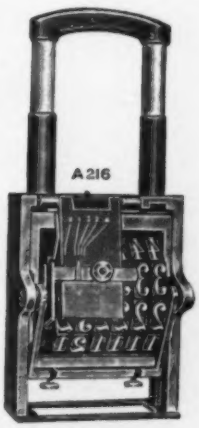

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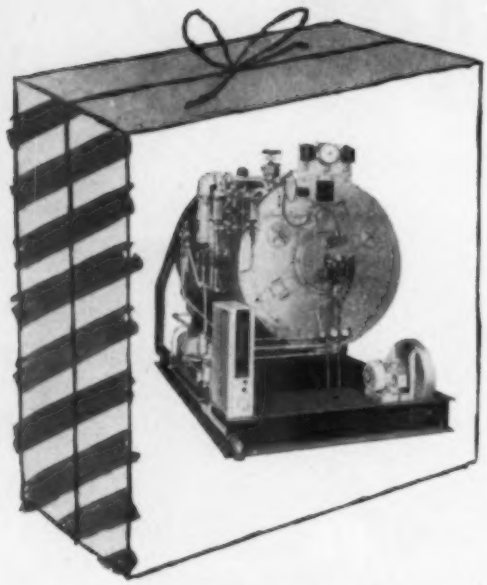

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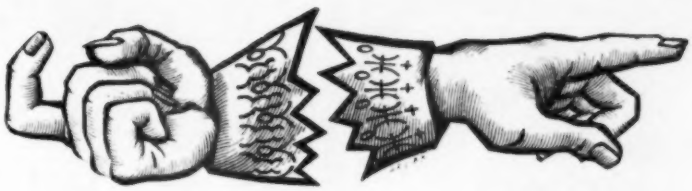

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The successful candidate will be responsible for all engineering services in the manufacturing division of the company. He should hold suitable qualifications (e.g. A.M.I.Mech.E. or equivalent) and have had previous experience in work of this nature preferably in the Pharmaceutical, Food or Dairy industry. Knowledge and experience of Packaging Machinery would be an advantage.

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Two pensionable posts in London for pharmaceutical chemists (men or women) at least 28 on 1/1/61. Candidates should normally be F.P.S. or have a degree in Pharmacy. Post (a) involves advising on pharmaceutical questions arising from N.H.S. (including pricing of prescriptions, costs of dispensing and preparation of Drug Tariff, with special reference to standards for surgical dressings and appliances); recent experience in retail pharmacy is desirable.

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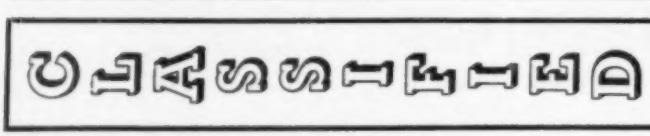
CHEMIST, with 20 years experience, and 12 as Works Manager of leading cosmetic and perfume manufacturers, seeks further executive post in cosmetic or light chemical field. Fully conversant with modern management methods, as well as costing, development and formulation of products.—Box 3042B, *Manufacturing Chemist*, 9, Eden Street, London, N.W.1.



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DAWSON Hydromatic Bottle Washer. Manesty D 4 Tableting Machine. Wetter Mincer with 7.5 h.p. motor. Vicars Fat Shredding Machine with 7.5 h.p. motor. For disposal.—A. Wander Ltd., King's Langley, Herts. Contact Mr. R. W. Peevers.

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Complete Evaporating Plant by A.P.V., comprising copper shell calandria with stainless steel contact, stainless steel flash chamber and balance tank, steam jacketed stainless steel finishing pan approx. 1,500 gal. capacity. Barometric condenser, vacuum pumps and all fittings.

Complete Vacuum Pressure Impregnated Plant by Barlow Whitney, comprising vertical mild steel autoclave, 5 ft. i.d. by 4 ft. 8 in. deep on straight with dished bottom, 60 p.s.i. internal w.p. Mild steel storage and preheating vessel, control cabinet, high vacuum pump, solvent condenser, catchpot, single-cylinder compressor low vacuum pump, horizontal receiver, etc.

Rotocell Rotary Vacuum Filter by International Combustion, drum 4 ft. 6 in. diam. by 18 in. face, cast iron construction with slotted copper filter plates. Mounted in plain bearings in mild steel trough. Usual vacuum connections. Drive from 5 h.p. 400/3/50 cycles motor with starter.

Mild steel Horizontal Jacketed Autoclave, 4 ft. by 4 ft. 6 in. long on straight with 9 in. dished end of ⅜ in. and ½ in. plate construction, swing door one end, supported on two mild steel cradles, with pipework, valves and control panels. Motorised wet vacuum pumps and two motorised water circulating pumps. Two AVAILABLE.

Horizontal Vacuum Drying Plant by Scott, comprising horizontal cylindrical agitated drier, 23 ft. long by 4 ft. i.d., jacket pressure to 10 p.s.i., chamber pressure 10 p.s.i. Drive by 10 h.p. 400/3/50 cycles motor. With steel feed hopper, electric vibration unit, vertical inclined steel enclosed belt and bucket elevator, 17½ cwt. steel holding bin, rotary brush sifter, horizontal single-cylinder pump, vertical condenser, etc.

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(*Continued from previous column*)

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Ref. A.942. British. Male. Married. Age 55. B.Sc.(Physics & Applied Maths) Assoc. of Inst. of Physics. 10 years Physicist, cathode ray tubes. 4 years Physicist, Geiger counting tubes. 2 years Physicist, television camera tubes. At present Physicist/Head of small production department, with manufacturers of electronic instruments. Seeks **DEVELOPMENT OR PRODUCTION POST.** West London or West Middlesex. £1,600 p.a.

Ref. A.943. Hungarian. Male. Married. **RESIDENT U.K.** Degree in Mech.Eng.Dipl.Ing. 1½ years Apprenticeship, toolroom, light engineering. 2½ years Project Engineer, iron, steel and machine production. 2 years Prototype manufacturers and machine development planning, machine tool production. 1 year Long term machine development planning, machine tool research. At present Project Engineer, control instrumentation. Seeks **DATA PROCESSING SYSTEM DESIGN OR MACHINE SPECIFICATION ENGINEERING FOR MACHINE TOOLS POST:** £1,300 p.a. approx.

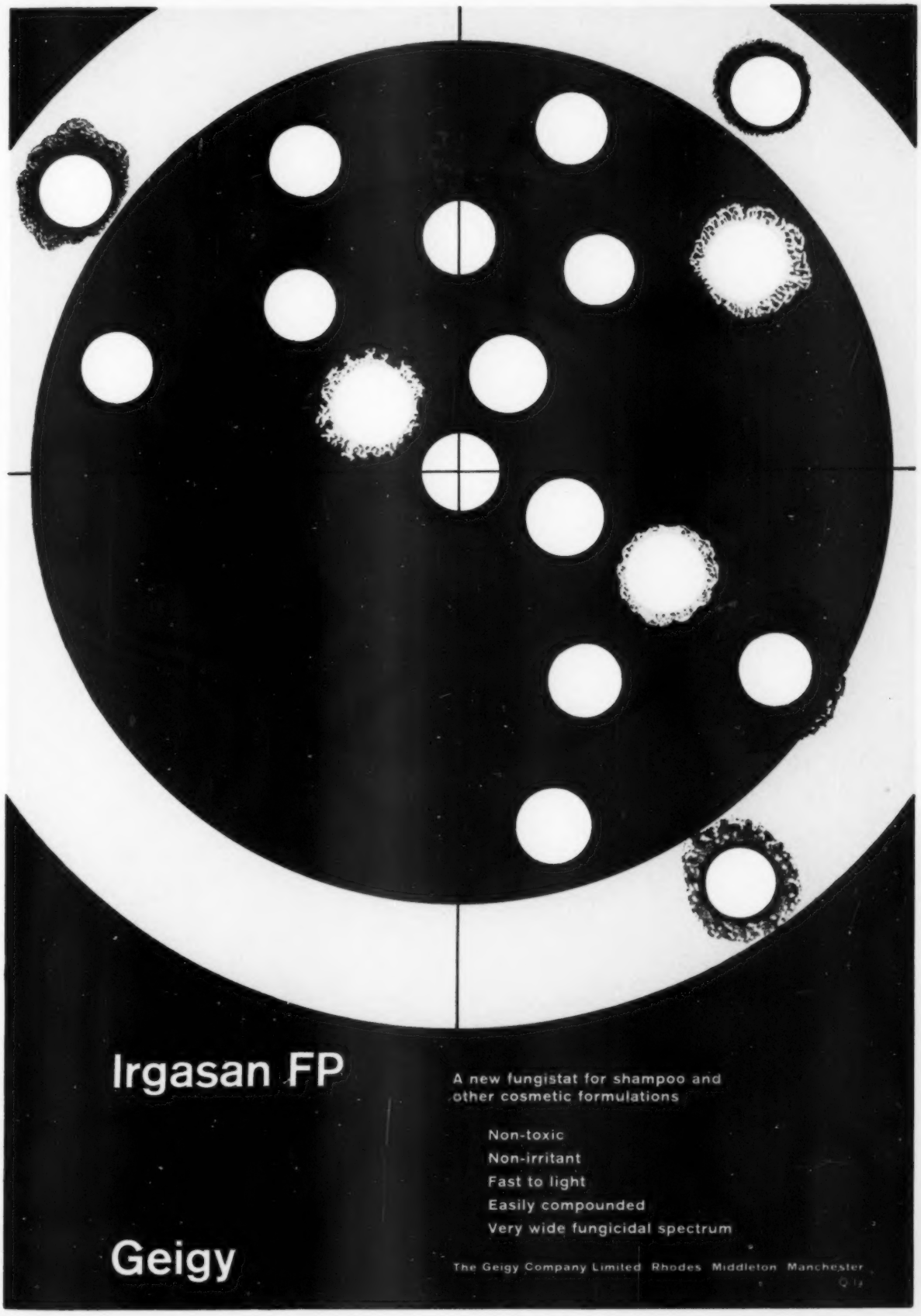
Ref. A.944. British. Male. Married. Age 41. H.N.C.Mech.Engg., A.M.I.Mech.E. 5 years Apprentice and 1 year Jig and Tool Draughtsman, railway workshop. 14 years Chief Jig and Tool Draughtsman, railway workshop. 4½ years Senior Designer, filtration and constant supports for pipe work. At present Chief Draughtsman, diesel locomotives and colliery winding engines. Teaches evening at Technical Institute in Mechanics, heat and electricity. Seeks post as **PROFESSIONAL ENGINEER/ CHIEF DRAUGHTSMAN.** London area £1,350 p.a. approx.

Ref. A.946. British. Male. Married. Age 40. H.N.C. Elec.Engg. A.M.S.I.T. Member E.P.E.A. (Tech. Sect). 4 years Electrical Tester and Fitter. 6 years R.N. Electrical Branch. 6 years Engineer in charge Division laboratory of electricity board. 4 years Meter Engineer, electrical manufacturers. 4 years Senior Assistant Engineer, electrical manufacturers. At present Senior Experimental Engineer, appliance and refrigeration manufacturing engineers. Seeks post as **DESIGN—TEST OR SERVICE ELECTRICAL ENGINEER.** London. £1,250 p.a.

Ref. A.947. British. Male. Single. Age 23. C. & G. Telecommunications. 3 years Radar Mechanic, R.A.F. 2 years Telecommunications Engineer, G.P.O. At present Sales Representative, manufacturers of Industrial Flooring. Seeks **SALES REPRESENTATIVE OR SALES ADMINISTRATION POST.** U.K. £650 p.a.

Ref. A.948. British. Male. Single. Age 37. B.Sc. (Chem.). 5 years Section Leader in production of inorganic chemicals. At present Research Chemist investigating chemical production methods with assayers and bullion merchants. Considerable administration experience (honorary capacity) in large sports organisation. Seeks **TECHNICAL SALES/SERVICE OR PRODUCTION POST.** London area preferably. £1,500 p.a.

Ref. A.949. British. Male. Single. Age 23. H.N.C, Mech.Engg. 3 years R.A.F. apprenticeship in aero engines. 3 years R.A.F. Technician. At present in Persia training for supervisory position in oil refinery, petroleum refining and producing company. Assoc. F. of British Interplanetary Soc. Seeks **AERONAUTICAL POST** U.S.A. or S. America.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